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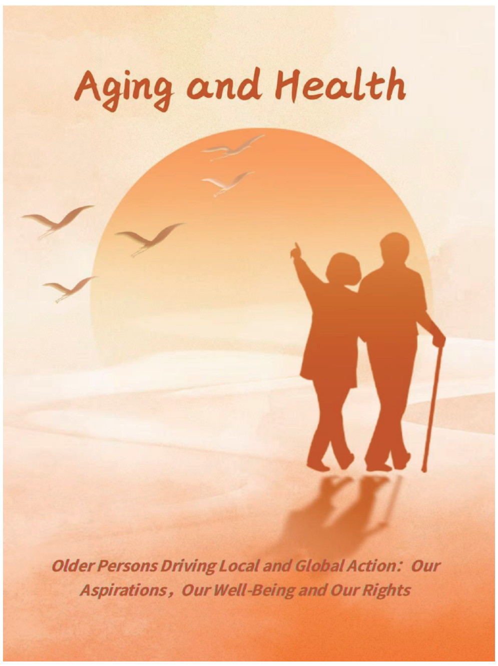


## Preplanned Studies



## Notifiable Infectious Diseases Reports



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Preplanned Studies

# Disability-Free Life Expectancy and Its Drivers Among Adults Aged 60 and Above — China, 2018 and 2023

Yuqing Feng[1,2,&]; Zhiwen Miao[3,&]; Yue Cai[3]; Chengdong Xu[1,2]; Shiyong Wu[3,#]; Jinfeng Wang[1,2,#]

**Summary**

**What is already known about this topic?**

Disability-free life expectancy (DFLE) is a vital measure of older adults' quality of life. Although its temporal trends and determinants have been examined in previous studies, spatial heterogeneity has often been underestimated, because most analyses were conducted at aggregated national or provincial levels, masking local variations due to limited data availability.

**What is added by this report?**

Compared with 2018, DFLE increased in 2023, and the urban-rural gap narrowed overall, with slower improvement in the western region. The determinants of DFLE varied by region, age, and urban-rural context.

**What are the implications for public health practice?**

Public health strategies should be tailored to urban and rural contexts. Priority should be given to strengthening healthcare access, social security systems, and climate-adaptive infrastructure, particularly in rural areas of western China.

## ABSTRACT

**Introduction**: Disability-free life expectancy (DFLE) is a key metric of healthy aging. While prior studies have explored its trends and provincial-level patterns, sub-provincial variations and urban-rural disparities in China are underexplored.

**Methods**: DFLE across prefectures was estimated using the Sullivan method, based on mortality data from the death registration system and disability data from the National Health Service Survey. A geodetector was used to assess the explanatory power of the socioeconomic, healthcare, environmental, and demographic factors.

**Results**: DFLE increased in all regions between 2018 and 2023, with a narrowing urban-rural gap. The largest gains occurred in the western region, but urban–rural inequality showed the least improvement. DFLE exhibited notable stratified spatial heterogeneity, predominantly driven by socioeconomic factors, whose influence weakened with advancing age, whereas environmental and demographic factors became more prominent. All the factors had stronger explanatory power in rural areas.

**Conclusion**: Although DFLE improved nationwide, inequalities persisted. Targeted public health strategies are needed to reduce disparities, with priority placed on healthcare access, social security, and climate-adaptive infrastructure in rural areas, particularly in western China.

In recent years, the life expectancy (LE) in China has continued to increase, reaching 79 years by 2024 (*1*). With the increase in LE, growing emphasis has been placed on quality of life. In the context of accelerated population aging, disability-free life expectancy (DFLE) among older adults has become a crucial indicator of the overall health of a society. In this study, DFLE was defined as the number of years an individual was expected to live without disability as measured by Activities of Daily Living (ADL). Previous studies have shown that DFLE among older adults has a steady upward trend; however, significant disparities persist across provinces and between genders (*2*–*3*). However, due to limitations in data availability, research on sub-provincial patterns and urban–rural differences remains limited.

Considering the disparities in health risks between geographic areas, especially between urban and rural areas, the spatial distribution and temporal trends of DFLE and the types, strengths, and age-specific effects of its determinants are likely to vary significantly. A comparative analysis of DFLE's spatiotemporal patterns and determinants among older adults in urban and rural areas can help elucidate the mechanisms underlying spatial health inequalities and support the development of tailored health interventions aimed at narrowing regional and urban–rural health gaps.

To address the gaps in existing research, this study analyzed the DFLE of Chinese adults aged 60 and above in 2018 and 2023, focusing on its spatiotemporal variations and urban–rural disparities and further identified the determinants underlying these differences.

Mortality data were obtained from the Center for Health Statistics and Information of the National Health Commission. Deaths were categorized into 19 age groups: <1 year, 1–4, 5–9, …, 80–84, and 85 years and above. Age-specific population counts were derived from the Sixth and Seventh National Population Censuses, with data for other years estimated through linear interpolation and extrapolation between the two census points. Data on ADL were obtained from the National Health Service Survey, which employed a multistage, stratified, cluster random sampling strategy. In the first stage, the country was divided into eastern urban, eastern rural, central urban, central rural, western urban, and western rural. From each stratum, 26 counties or districts were randomly selected, yielding 156 sample units. Then, five townships or subdistricts were randomly selected from each sampled county. Subsequently, two villages or neighborhood committees were randomly chosen within each township or subdistrict. Finally, 60 households were systematically sampled from each selected village or neighborhood committee (*4*).

Urban areas were defined as municipalities and prefecture-level municipal districts, whereas rural areas were defined as counties and county-level cities. The ADL questionnaire consisted of six items: dressing, eating, bathing, getting in and out of bed, using the toilet, and controlling bowel and bladder functions. The proportion of individuals who reported no difficulty with all six tasks at each survey site was calculated and used as an age-specific health status indicator.

Based on previous literature and data availability, this study incorporated determinants from four domains: environment, socioeconomic level, healthcare resources, and demographic characteristics. For environmental factors, annual average temperature, total annual precipitation, average annual particulate matter (PM) 2.5 concentration, and normalized difference vegetation index (NDVI) were included. Socioeconomic indicators included per capita disposable income, gross domestic product (GDP) per capita, and proportion of educational expenditure (share of government education spending in the local public budget). Healthcare resources were measured as the number of physicians per thousand people. Regarding demographic characteristics, old-age dependency ratio was used as a key indicator. Environmental data were obtained from the National Tibetan Plateau / Third Pole Environment Data Center (http://data.tpdc.ac.cn). Data for the other influencing factors were sourced from statistical yearbooks and population censuses.

The Geodetector method was employed to quantify the explanatory power of various determinants of spatial disparities in the DFLE. The core assumption of this method is that, if an independent variable significantly affects a dependent variable, their spatial distributions should exhibit similarity (*5*–*6*). By stratifying each determinant in a way that minimized the within-group variance and maximized the between-group variance of DFLE, the method assessed the explanatory power of each factor. This explanatory power was quantified using the *q*-statistic as follows:

$$q = 1 - \frac{SSW}{SST} = \left(1 - \frac{\sum_{h=1}^{L} N_h \sigma_h^2}{N\sigma^2}\right) \times 100\%$$

where $h$=1, …, L denotes the strata or categories of the dependent variable Y or the explanatory variable X; $\sigma_h^2$ and $\sigma^2$ represent the number of units in stratum $h$ and in the entire study area, respectively. The sum of squares within strata (SSW) indicates the total within-group variance, whereas the total sum of squares (SST) represents the total variance across the study area. The *q*-statistic ranges from 0 to 1, reflecting the strength of spatial heterogeneity or the degree of association between the dependent and stratified explanatory variables. A higher *q* value implies a greater explanatory power of the factor over the spatial distribution of the dependent variable. All statistical analyses were performed using the R (version 4.3.0, R Foundation for Statistical Computing, Vienna, Austria).

Between 2018 and 2023, the age-specific DFLE at the age of 60 increased across urban and rural areas in the eastern, central, and western regions of China (Figure 1). However, the magnitude of this increase diminished with advancing age. DFLE was highest in the eastern region, followed by the central and western regions, and was consistently higher in urban areas than in rural areas (Figure 2). The absolute increase in DFLE was greater in rural areas than in urban areas, with the most significant DFLE gains observed in western urban centers (1.28 years) and central rural regions (1.58 years).

The urban–rural DFLE gap exhibited an east-to-

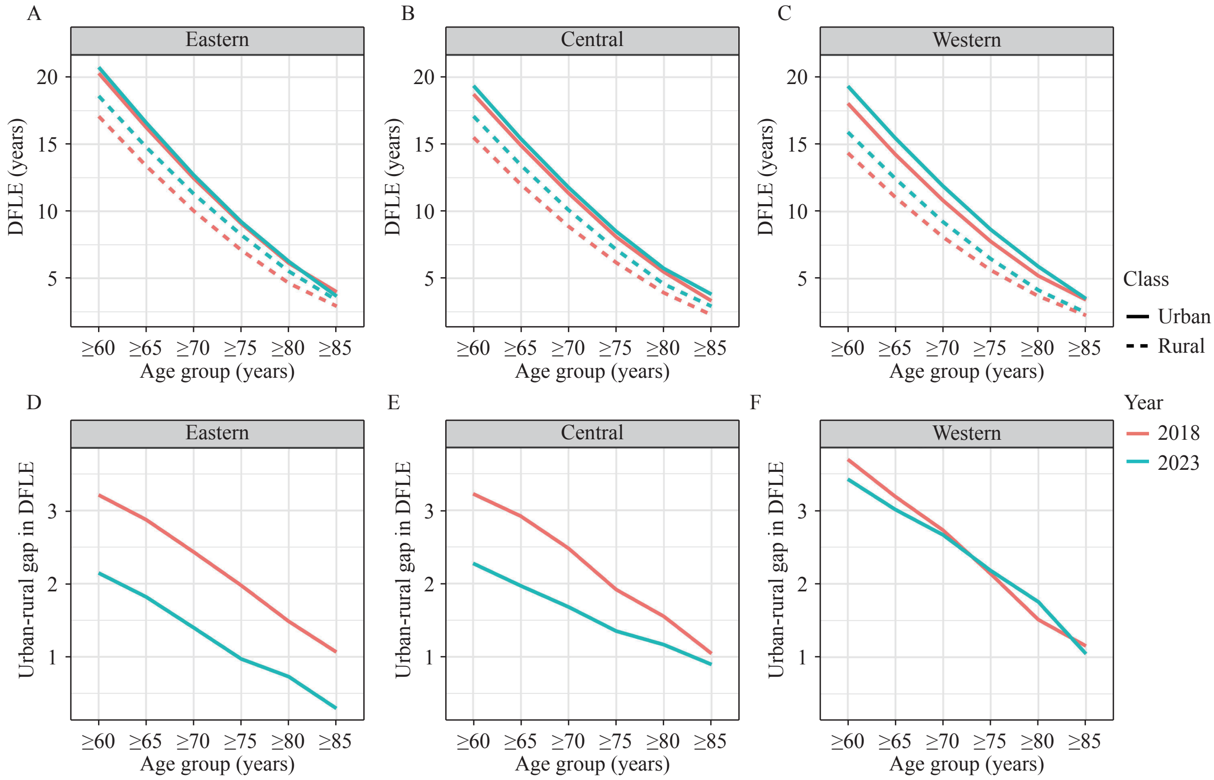


FIGURE 1. DFLE and its urban-rural gaps by age group in eastern, central, and western China, 2018 and 2023. (A–C) DFLE in eastern, central, and western China; (D–F) corresponding urban–rural gaps.
Abbreviation: DFLE=disability-free life expectancy.

west gradient, with the largest gap observed in the western region in 2018 (3.69 years), followed by the central (3.22 years) and eastern (3.21 years) regions. By 2023, the gap had narrowed in all 3 regions, with the most significant reduction seen in the east (down to 2.15 years), followed by the central region (2.27 years), while the gap in the west remained the largest (3.43 years). The urban–rural DFLE gap decreased progressively as age increased. Compared to the eastern and central regions, the urban–rural gap in the DFLE in the western region showed low levels of improvement between 2018 and 2023, with a notable widening in the 70–79 age group.

Figure 3 displays the *q*-values for all the examined determinants. Socioeconomic, healthcare, environmental, and demographic determinants significantly influenced the DFLE in urban and rural areas. In urban areas, socioeconomic indicators were the dominant contributors to DFLE disparities among those aged 60 and above, with disposable income per person ($q$=0.34) and GDP per capita ($q$=0.32) showing the highest influence. Among non-socioeconomic variables, precipitation and the number of physicians per thousand people showed the highest explanatory power, with *q*-values of 0.16 and 0.11, respectively. Similarly, the socioeconomic variables were predominant in rural areas, with per-person disposable income ($q$=0.48) and GDP per capita ($q$=0.36) showing the strongest correlations. Among the environmental determinants, the annual average temperature ($q$=0.46) and total annual precipitation ($q$=0.29) displayed the highest *q*-values, placing them immediately after socioeconomic factors.

Compared with urban areas, all determinants demonstrated stronger explanatory power in rural areas. Although the *q*-values of most determinants declined or showed little change with increasing age, the *q*-values for NDVI and $PM_{2.5}$ in urban regions, average annual temperature, total annual precipitation, NDVI, and the old-age dependency ratio in rural regions increased steadily.

## DISCUSSION

In this study, the DFLE in the urban and rural regions of China for 2018 and 2023 was calculated and its temporal dynamics and spatial distribution were analyzed. Additionally, age-specific differences in the

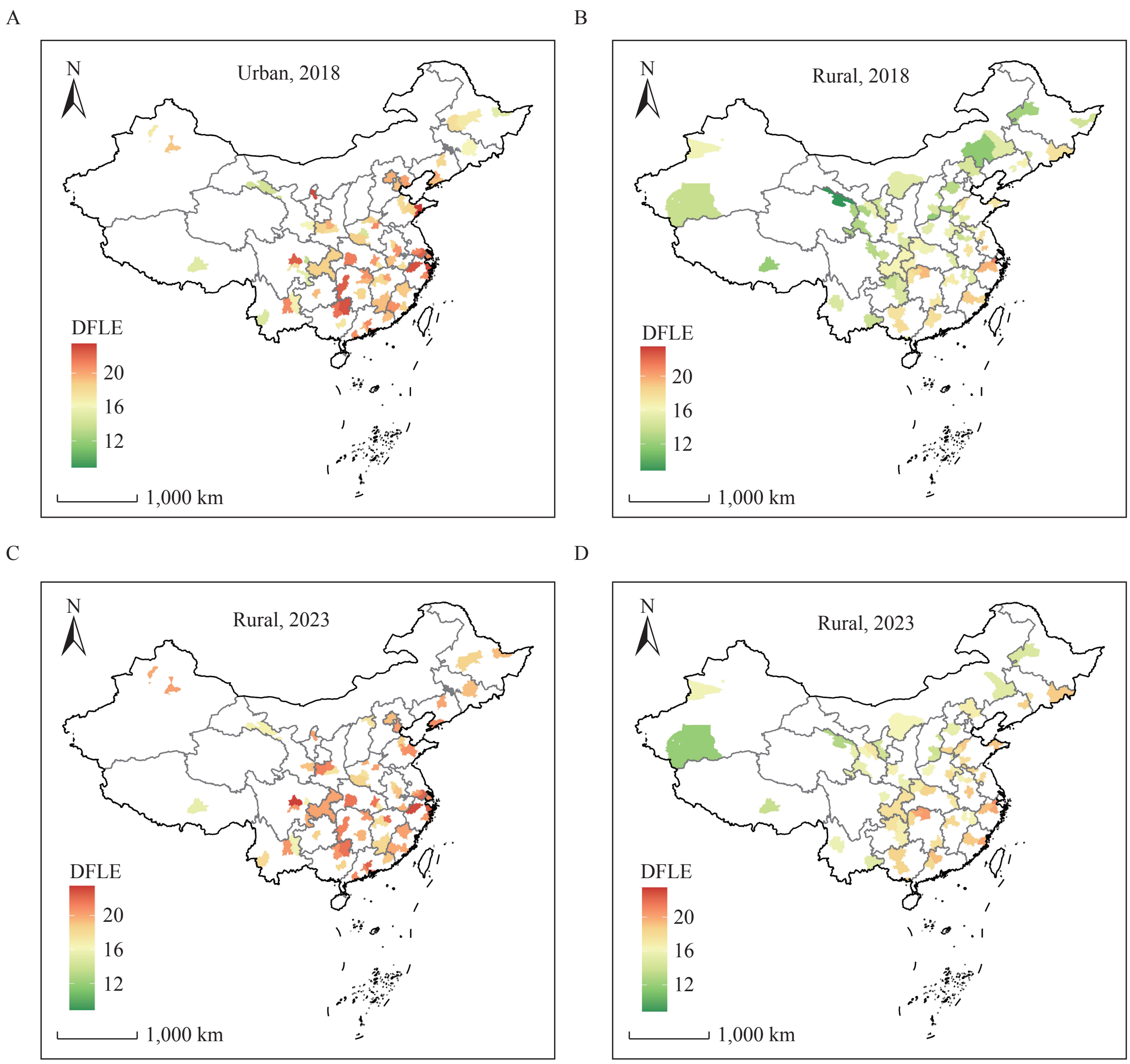


FIGURE 2. Spatial distribution of DFLE at age 60 in urban and rural areas of China, 2018 and 2023. (A) Urban areas in 2018; (B) rural areas in 2018; (C) urban areas in 2023; (D) rural areas in 2023.
Map approval number: GS 京 (2025) 1982 号.
Abbreviation: DFLE=Disability-free life expectancy.

influence of socioeconomic, healthcare, environmental, and demographic determinants of DFLE between urban and rural areas were examined. The findings revealed significant spatial heterogeneity in DFLE, characterized by a gradient rising from west to east, and consistently higher DFLE in urban areas than in rural regions. The DFLE increased between 2018 and 2023, and the urban-rural gap in DFLE narrowed across all regions.

For those aged 60 and above, rural areas showed greater DFLE increases than urban areas, particularly in the western urban and central rural areas. However, despite the overall positive trend, the DFLE gap in the western region remained relatively wide and showed limited improvement. In some age groups, the urban-rural gap increased slightly. Compared with the eastern regions, western rural areas often face more constraints, including lower levels of medical insurance coverage, inadequate health service capacity, and underinvestment in age-friendly infrastructure. Additionally, older adults in western rural areas are more frequently exposed to challenging natural environments (*7*). These issues limit the effectiveness of public health interventions, particularly for older adults living in remote resource-constrained settings. These disparities may explain why the DFLE gains in western rural areas lag, particularly in older age groups.

Spatial heterogeneity in DFLE reflects the interplay between various determinants, predominantly socioeconomic factors. Furthermore, the influence and

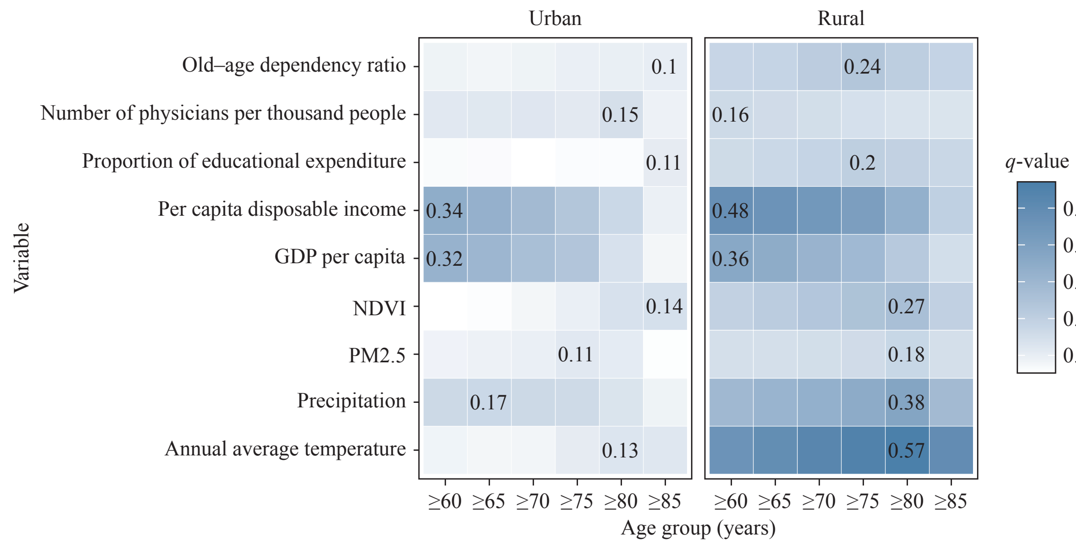


FIGURE 3. Age-specific *q*-values of determinants for DFLE in urban and rural areas.
Note: Numerical labels indicate the age group with the highest *q*-value for each determinant and its corresponding *q*-value.
Abbreviation: GDP=Gross domestic product; NDVI=Normalized difference vegetation index; PM=Particulate matter; DFLE=Disability-free life expectancy.

age-specific patterns of these determinants vary between urban and rural areas. Socioeconomic determinants are key drivers of spatial heterogeneity in DFLE (*8*). They influence health through multiple pathways by directly affecting living standards and correlating with access to health resources, lifestyle choices, and health-related behavioral patterns (*9*). Higher income, better education, and greater availability of medical resources are generally associated with a longer DFLE. In contrast, rural regions often face challenges, such as limited health and social services, higher old-age dependency, and greater exposure to environmental stressors, which may contribute to lower DFLE and wider geographic disparities (*10–11*).

The influence of socioeconomic factors on DFLE was also found to decline with increasing age, whereas environmental and demographic factors became more important in the oldest groups. This is primarily because, as people age, biological and physiological factors become more dominant in influencing health, while the impact of socioeconomic status, along with associated health behaviors and resources, gradually weakens (*12*). Simultaneously, older populations are more physiologically vulnerable to environmental stress and more dependent on family and community support (*13*).

This study's authors recommend continued monitoring of DFLE across different regions and population groups to promote elderly health and reduce urban-rural and regional disparities. Policy efforts should prioritize improving the accessibility and quality of healthcare services in remote areas; expanding social security and long-term care programs tailored to rural elderly populations; and investing in climate-adaptive infrastructure, transportation networks, and community-based elderly care facilities. Supporting localized health workforce development may further strengthen service delivery in under-resourced settings. These comprehensive and regionally tailored strategies are essential for narrowing DFLE gaps and achieving equitable healthy aging nationwide.

This study had the following limitations. First, as all environmental variables (e.g., temperature, precipitation, $PM_{2.5}$, and NDVI) were measured as annual averages, they may not reflect the sudden health effects of short-term extreme events in older adults. Second, the use of linear interpolation between the sixth and seventh national censuses to estimate age-specific population figures may fail to capture year-to-year variation.

**Conflicts of interest**: No conflicts of interest.

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Preplanned Studies

# Prevalence of Depression and Anxiety Symptoms and the Influencing Factors Among Older Adults Aged 60 Years and Over — 7 PLADs, China, 2024

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**Summary**

**What is already known about this topic?**

Mental health problems in older adults have become a major public health concern.

**What is added by this report?**

The prevalence of depression and anxiety symptoms in adults aged ≥60 years was 13.8% and 8.0%, respectively. Compared with good sleep quality, the odds ratio (95% confidence interval) of depression and anxiety for those with poor sleep quality was 7.88 (6.33, 9.79) and 6.42 (5.02, 8.22), respectively.

**What are the implications for public health practice?**

Early screening for depression and anxiety, lifestyle interventions and chronic disease management should be strengthened to promote mental health of older adults.

## ABSTRACT

**Introduction:** The prevalence of depression and anxiety among older adults has become a significant public health concern. This study aimed to identify the key demographic and health-related correlates of these mental health issues.

**Methods:** A cross-sectional survey of seven provincial-level administrative divisions (PLADs) in China was conducted in 2024. The Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) scales were used to assess the mental health status of older adults. In total, 20, 113 participants aged ≥60 years were included in this study.

**Results:** The analysis revealed a prevalence rate of 13.8% [95% confidence interval (*CI*): 12.1%–15.5%] for depression and 8.0% (95% *CI*: 7.0%, 9.0%) for anxiety. Depression and anxiety symptoms are more common among older adults who are older, female, and have comorbid chronic diseases, lack of physical activity, and poor sleep quality. Compared with good sleep quality, the odds ratio (*OR*) (95% *CI*) for depression for those with poor sleep quality was 7.88 (6.33, 9.79), and for anxiety was 6.42 (5.02, 8.22), respectively.

**Conclusions:** Early screening for depression and anxiety, lifestyle interventions and chronic disease management should be strengthened to promote the mental health of older adults.

The increasing prevalence of depression and anxiety among older adults is a growing concern worldwide (*1*). Depression and anxiety disorders impose a substantial burden on older adults, aggravating chronic diseases and increasing dementia risk (*2*). The Healthy China 2030 Action Plan proposes indicators to slow down the rising trends of anxiety and depression, including requirements to promote mental health in this population. The most recent nationwide report on anxiety among older adults was from the Chinese Longitudinal Healthy Longevity Survey (CLHLS) conducted in 2018 (*3*). However, current literature on the mental health of older adults has primarily focused on localized studies or clinical samples. This study aimed to provide a comprehensive overview of the prevalence of depression and anxiety among older adults in China and their associated factors across seven provincial-level administrative divisions (PLADs).

This study employed a multistage stratified cluster probability sampling design to ensure national representation. In the first stage, one PLAD was selected from each of the seven major geographical regions of China, yielding seven areas: Hebei (North China), Liaoning (Northeast China), Jiangsu (East China), Henan (Central China), Guangdong (South China), Chongqing (Southwest China), and Shaanxi (Northwest China). For each selected area, 10 districts/counties were sampled using probability proportional to size (PPS) sampling, resulting in 70 districts/counties nationwide. In the second stage, three subdistricts/townships were selected from each site using the PPS. In the third stage, two neighborhood committees/villages were sampled from each subdistrict/township using PPS. In the fourth stage, 120 households were selected within each neighborhood committee or village using simple random sampling (SRS). Finally, one eligible individual from each household was randomly selected to participate in the survey. The inclusion criteria were as follows: aged ≥15 years, Chinese residents who considered their current residence as their primary dwelling for at least one month before the survey, and sufficient physical and cognitive abilities to complete the questionnaire. Exclusion criteria included primarily residing in collective settings (e.g., student dormitory, military barracks, prisons, or hospitals) and a diagnosis of dementia or other severe mental health disorders. Quality control: The electronic questionnaire design limited illogical data entry; all investigators received uniform training and examination, the China CDC verified the collected data, and two independent statistical analysts processed, analyzed, and compared the data. In total, 50,400 eligible participants were enrolled, of whom 46,452 completed the survey, yielding a response rate of 92.2%. There were 46,309 participants after excluding missing data on the self-reported anxiety and depression scales, of whom 20,113 were older adults aged ≥60 years.

Mental health was assessed using the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder Questionnaire (GAD-7). The PHQ-9 score ranges from 0 to 27 and is categorized as minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), or severe (20–27) (*4*). Anxiety severity was estimated using the GAD-7 total score, which ranges from 0 to 21 and is classified as minimal (0–4), mild (5–9), moderate (10–14), or severe (15–21) (*5*). The Cronbach's alpha coefficient in this study of PHQ-9 and GAD-7 was 0.85 and 0.90, respectively.

The basic demographic information and lifestyle factors collected included age, sex, household registration, education level, number of chronic diseases (cardiovascular diseases, cancers, chronic obstructive pulmonary disease, hypertension, and diabetes), sleep quality, and physical activity. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), with a score of ≥5 indicating sleep disturbance (*6*).

Characteristics of older adults aged ≥60 years were reported as means with 95% confidence intervals (*CI*s) for continuous variables. Percentages with 95% *CI*s were used as categorical variables. Anxiety and depression prevalence among older adults was presented as point estimates with 95% *CI*s. Differences between subgroups were assessed using Rao-Scott $\chi^2$ tests. Multilevel modeling of complex survey data was used to explore factors associated with depression and anxiety. All estimates incorporated sampling weights, non-response adjustment weights, and post-stratification correction weights to ensure population representativeness. Missing values for educational level were not imputed because the proportion of missing data was <1.0%. Statistical analyses were conducted using the SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA). All tests were two-tailed, and statistical significance was defined as $P$<0.05.

Among the 20,113 older adults included in the analysis, the mean age was 68.9, with males accounting for 48.7% and urban residents accounting for 34.8%. Specific demographic information is shown in Table 1. Table 2 summarizes the participants' characteristics according to their depression and anxiety symptoms. The prevalence of depressive symptoms among older adults was 13.8% (95% *CI*: 12.1%, 15.5%), while the prevalence of anxiety symptoms was 8.0% (95% *CI*: 7.0%, 9.0%). Depression and anxiety symptoms were more common among people who were older in age, female, had lower educational levels, comorbid chronic diseases, poor sleep quality, or inadequate physical activity.

Table 3 shows the results of logistic regression analysis of multiple factors of PSQ-9 and GAD-7 symptoms. The respondents who were female, had chronic diseases, and sleep disturbance were more likely to suffer from depression. Notably, older adults with sleep disturbance had a significantly higher proportion of depression symptoms [odds ratio (*OR*)=7.88, 95% *CI*: 6.33, 9.79]. Middle school education level (*OR*=0.81, 95% *CI*: 0.66, 0.99), high school education level (*OR*=0.61, 95% *CI*: 0.47, 0.79), and >5 sessions of physical activity per week (*OR*=0.71, 95% *CI*: 0.62, 0.82) appeared to have a protective effect against depression. Regarding anxiety symptoms, females, and those with chronic diseases were more likely to suffer from anxiety symptoms. Sleep disturbance also showed a significantly higher proportion with anxiety (*OR*=6.42, 95% *CI*: 5.02, 8.22).

TABLE 1. Characteristics of the surveyed older adults aged 60 and above from 7 PLADs in China, 2024.

| Subgroup | *n* | *n* (weighted) | Weighted mean/proportion (95% *CI*) |
|---|---|---|---|
| Demographic characteristics | | | |
| Age in years (mean) | | | 68.9 (68.7, 69.1) |
| Age group (years) | | | |
| 60–69 | 10,756 | 61,399,716 | 59.6 (58.1, 61.0) |
| 70–79 | 7,613 | 34,095,710 | 33.1 (31.8, 34.4) |
| ≥80 | 1,744 | 7,557,263 | 7.3 (6.7, 8.0) |
| Sex | | | |
| Female | 9,992 | 52,854,691 | 51.3 (49.9, 52.7) |
| Male | 10,121 | 50,197,999 | 48.7 (47.3, 50.1) |
| Residence | | | |
| Urban | 9,309 | 35,827,294 | 34.8 (29.5, 40.0) |
| Rural | 10,804 | 67,225,396 | 65.2 (60.0, 70.5) |
| Education level | | | |
| Primary school or below | 10,483 | 50,510,349 | 49.1 (45.5, 52.7) |
| Middle school | 6,494 | 33,061,530 | 32.1 (30.0, 34.3) |
| High school | 2,584 | 15,783,333 | 15.3 (13.5, 17.2) |
| College or above | 518 | 3,503,449 | 3.4 (2.3, 4.6) |
| Health characteristics | | | |
| Number of chronic diseases | | | |
| 0 | 7,233 | 38,828,781 | 37.7 (35.3, 40.0) |
| 1 | 6,340 | 32,337,043 | 31.4 (30.3, 32.5) |
| ≥2 | 6,540 | 31,886,866 | 30.9 (28.8, 33.1) |
| Depression score (mean) | | | 1.8 (1.6, 2.0) |
| Depression severity | | | |
| None | 17,043 | 88,807,957 | 86.2 (84.5, 87.9) |
| Mild | 2,125 | 10,067,776 | 9.8 (8.5, 11.0) |
| Moderate | 597 | 2,672,107 | 2.6 (2.1, 3.1) |
| Severe | 348 | 1,504,850 | 1.5 (1.2, 1.7) |
| Anxiety score (mean) | | | 1.1 (0.9, 1.2) |
| Anxiety severity | | | |
| None | 18,305 | 94,808,272 | 92.0 (91.0, 93.0) |
| Mild | 1,281 | 5,991,532 | 5.8 (5.0, 6.6) |
| Moderate | 345 | 1,487,674 | 1.4 (1.2, 1.7) |
| Severe | 182 | 765,212 | 0.7 (0.5, 1.0) |
| Sleep disturbance | | | |
| Yes | 8,097 | 39,313,936 | 38.2 (35.8, 40.5) |
| No | 12,016 | 63,738,754 | 61.9 (59.5, 64.2) |
| Times of physical activity per week | | | |
| 0–2 | 10,442 | 53,171,332 | 51.6 (48.8, 54.4) |
| 3–4 | 1,620 | 8,219,861 | 8.0 (7.1, 8.9) |
| ≥5 | 8,051 | 41,661,496 | 40.4 (37.9, 43.0) |

Abbreviation: *CI*=confidence interval; PLADs=provincial-level administrative divisions.

TABLE 2. Prevalence of depressive and anxiety symptoms in the participants by different characteristics from 7 PLADs in China, 2024.

| Subgroup | Depressive symptoms | | | Anxiety symptoms | | |
|---|---|---|---|---|---|---|
| | Weighted % (95% *CI*) | $\chi^2$ | *P* | Weighted % (95% *CI*) | $\chi^2$ | *P* |
| Age group (years) | | 79.1 | <0.001 | | 4.6 | 0.076 |
| 60–69 | 11.6 (10.0, 13.2) | | | 7.5 (6.3, 8.6) | | |
| 70–79 | 16.7 (14.6, 18.7) | | | 8.6 (7.1, 10.0) | | |
| ≥80 | 19.2 (16.0, 22.4) | | | 9.8 (7.7, 11.9) | | |
| Sex | | 123.4 | <0.001 | | 96.0 | <0.001 |
| Female | 17.5 (15.4, 19.6) | | | 10.8 (9.3, 12.3) | | |
| Male | 10.0 (8.5, 11.4) | | | 5.0 (4.3, 5.8) | | |
| Residence | | 1.6 | 0.211 | | 1.7 | 0.196 |
| Urban | 12.4 (9.5, 15.3) | | | 7.1 (5.3, 8.8) | | |
| Rural | 14.6 (12.6, 16.7) | | | 8.5 (7.2, 9.8) | | |
| Education level | | 75.1 | <0.001 | | 69.5 | <0.001 |
| Primary school or below | 17.7 (15.4, 20.0) | | | 10.7 (9.2, 12.3) | | |
| Middle school | 11.1 (9.6, 12.6) | | | 6.2 (5.3, 7.2) | | |
| High school | 8.3 (6.8, 9.8) | | | 3.9 (2.9, 5.0) | | |
| College or above | 7.9 (3.7, 12.1) | | | 3.1 (1.0, 5.2) | | |
| Number of chronic diseases | | 145.0 | <0.001 | | 113.1 | <0.001 |
| 0 | 6.1 (4.9, 7.3) | | | 4.1 (3.1, 5.0) | | |
| 1 | 12.1 (10.6, 13.5) | | | 7.1 (5.8, 8.4) | | |
| ≥2 | 25.0 (22.0, 28.1) | | | 13.7 (12.0, 15.4) | | |
| Sleep disturbance | | 327.5 | <0.001 | | 263.7 | <0.001 |
| Yes | 29.6 (26.5, 32.7) | | | 17 (15.0, 18.9) | | |
| No | 4.1 (3.1, 5.1) | | | 2.5 (1.9, 3.1) | | |
| Times of physical activity per week | | 24.5 | <0.001 | | 18.8 | <0.001 |
| 0–2 | 15.7 (13.6, 17.7) | | | 9.4 (8.0, 10.8) | | |
| 3–4 | 13.2 (10.0, 16.4) | | | 7.5 (5.3, 9.6) | | |
| ≥5 | 11.6 (10.0, 13.2) | | | 6.3 (5.3, 7.4) | | |
| Total | 13.8 (12.1, 15.5) | | | 8.0 (7.0, 9.0) | | |

Abbreviation: *CI*=confidence interval; PLADs=provincial-level administrative divisions.

## DISCUSSION

Using a nationwide cross-sectional survey based on the 7 PLADs dataset, this study examined the prevalence of depression and anxiety among older adults across diverse demographic backgrounds. Anxiety and depression were more common among older adults who were female, had lower educational levels, comorbid chronic diseases, poor sleep quality, or inadequate physical activity, several of which were modifiable. This study's findings underscore the importance of lifestyle interventions and strengthening the prevention and management of chronic diseases to support healthy aging.

This study showed that the prevalence of depression and anxiety symptoms among older adults was 13.8% (95% *CI*: 12.1%, 15.5%) and 8.0% (95% *CI*: 7.0%, 9.0%), respectively. Compared with the prevalence of anxiety symptoms of 11.24% among older adults in the CLHLS conducted in 2018 (*3*), the prevalence of anxiety symptoms in this study was lower. This difference may be due to variations in the age composition of the participants in the two studies; the CLHLS included a higher proportion of older adults, and since anxiety incidence increases with age, this could explain the higher prevalence observed. Additionally, differences in the survey years may have contributed to this result. Analyses of the global

TABLE 3. Multivariable logistic regression analysis of depressive and anxiety symptoms in older adults from 7 PLADs of China, 2024.

| Subgroup | Depressive symptoms | | Anxiety symptoms | |
|---|---|---|---|---|
| | ***OR* (95% *CI*)** | ***P*** | ***OR* (95% *CI*)** | ***P*** |
| Age (years) | | | | |
| 60–69 | 1 | | 1 | |
| 70–79 | 1.07 (0.93, 1.22) | 0.34 | 0.77 (0.64, 0.93) | <0.01 |
| ≥80 | 1.19 (0.92, 1.55) | 0.19 | 0.82 (0.60, 1.13) | 0.22 |
| Sex | | | | |
| Male | 1 | | 1 | |
| Female | 1.37 (1.18, 1.59) | <0.01 | 1.58 (1.38, 1.81) | <0.01 |
| Residence | | | | |
| Urban | 1 | | 1 | |
| Rural | 1.04 (0.78, 1.38) | 0.79 | 0.98 (0.75, 1.29) | 0.89 |
| Education level | | | | |
| Primary school or below | 1 | | 1 | |
| Middle school | 0.81 (0.66, 0.99) | 0.04 | 0.72 (0.58, 0.89) | <0.01 |
| High school | 0.61 (0.47, 0.79) | <0.01 | 0.45 (0.33, 0.62) | <0.01 |
| College or above | 0.74 (0.40, 1.37) | 0.34 | 0.46 (0.25, 0.86) | 0.02 |
| Number of chronic diseases | | | | |
| 0 | 1 | | 1 | |
| 1 | 1.68 (1.34, 2.11) | <0.01 | 1.45 (1.13, 1.85) | <0.01 |
| ≥2 | 3.39 (2.63, 4.36) | <0.01 | 2.47 (1.92, 3.17) | <0.01 |
| Sleep disturbance | | | | |
| No | 1 | | 1 | |
| Yes | 7.88 (6.33, 9.79) | <0.01 | 6.42 (5.02, 8.22) | <0.01 |
| Times of physical activity per week | | | | |
| 0–2 | 1 | | 1 | |
| 3–4 | 0.76 (0.55, 1.03) | 0.08 | 0.74 (0.55, 1.01) | 0.06 |
| ≥5 | 0.71 (0.62, 0.82) | <0.01 | 0.70 (0.58, 0.85) | <0.01 |

Abbreviation: PLADs=provincial-level administrative divisions; *OR*=odds ratio; *CI*=confidence interval.

burden of disease from 1990 to 2019 showed that the prevalence of anxiety disorders and the DALY rate declined (*2*). It is possible that this survey's results were lower than those of the CLHLS conducted in 2018. Regarding the influencing factors of anxiety and depression, this study shows that older adults with sleep disturbances have a very high risk of developing anxiety and depressive problems, with *OR* values of 7.88 (95% *CI*: 6.33, 9.79) and 6.42 (95% *CI:* 5.02, 8.22), respectively. Other studies have also found that poor sleep quality is highly associated with depression and anxiety, but the OR values reported were relatively low. This discrepancy in OR values may be due to differences in the samples, areas, and definitions of poor sleep quality used across studies. In this study, poor sleep quality was defined as a PSQI score of 5 or higher, while other studies have used a cutoff of 7. The China Short-term Health Effects of Air Pollution Study, using the cutoff of 7, found that, compared with good sleep quality, the *OR* (95% *CI*) of anxiety for those with poor sleep quality was 5.12 (3.88, 6.77)(*7*). Regarding the impact of sleep on depression, it was also found that patients with stroke with poor sleep quality were more likely to develop depressive symptoms (*8*). Sleep problems are prevalent among older adults, and improving sleep quality is important for reducing the likelihood of anxiety and depression. Moreover, comorbid chronic diseases severely affect mental health in the older adult population. Previous studies have shown that patients with chronic diseases have a higher prevalence of anxiety and depressive symptoms (*3*,*9*). This study also found that having multiple chronic diseases increased the risk of depressive and anxiety symptoms.

The findings in this report are subject to at least three limitations. First, the cross-sectional design restricts the ability to establish causal relationships between the identified risk factors and the prevalence of depression and anxiety among older adults. Second, depression and anxiety symptoms were self-assessed rather than clinically diagnosed, which may involve potential inaccuracies due to subjective self-reporting and individual judgment. Finally, reliance on self-reported measures may introduce recall bias.

Future prospective studies are warranted to validate these findings and explore the underlying mechanisms linking identified risk factors to mental health outcomes in older adults. In conclusion, this study found a high prevalence of depression and anxiety among older adults. This highlights the importance of lifestyle interventions and chronic disease management for promoting physical and mental health. The government should pay attention to the mental health issues of older adults, including sleep-related issues, and strengthen the implementation and enforcement of existing plans/work, such as the National Healthy Lifestyle Action and the management of chronic diseases in basic public health services (*10*). Mental health should be integrated into overall healthcare services, and health service programs for older adults should be actively utilized to conduct screening and early intervention for depression and anxiety. They should also enhance public education and promote public knowledge and skills regarding healthy lifestyles and chronic disease prevention and control.

**Ethical statement**: Approved by the Institutional Review Board of the China Centers for CDC and Prevention (approval number 202410).

**Conflicts of interest**: No conflicts of interest.

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Preplanned Studies

# The Evolution of Patterns of Mortality and Disability Burden Among Older Adults — China, 1990–2023

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**Summary**

**What is already known about this topic?**

China's aging population has a heavy chronic disease burden. Existing research often overlooks health heterogeneity among older age groups, relies on mortality metrics, and lacks information on long-term disability trends.

**What is added by this report?**

This study reveals that all-cause mortality declined substantially, whereas years lived with disability (YLDs) remained stable. Alzheimer's disease and other dementias (ADOD) exhibited the fastest increase in mortality [average annual percent change (AAPC)=1.76, 95% confidence interval (*CI*): 1.63, 1.87]. Age-related hearing loss and falls dominated YLDs.

**What are the implications for public health practice?**

Public health strategies should shift from general approaches to age-tailored interventions. Integrating evidence-based stratified strategies is crucial for reducing disability and advancing Healthy China by 2030.

## ABSTRACT

**Introduction:** China's rapidly aging population poses profound public health challenges. Current research overlooks health heterogeneity across older subgroups, limiting the effectiveness of policy responses. This study addresses these gaps to inform targeted health strategies.

**Methods:** Using data from the Global Burden of Disease Study 2023, we analyzed age-specific mortality rate (MR) and years lived with disability (YLDs) among Chinese older adults (60–74, 75–89, and 90 years and above) from 1990 to 2023. Temporal trends were assessed using average annual percentage change (AAPC).

**Results:** From 1990–2023, all-cause MR declined substantially; YLDs remained stable. Stroke, ischemic heart disease (IHD), and chronic obstructive pulmonary disease remained the leading causes of mortality. Alzheimer's disease and other dementias (ADOD) showed the most rapid MR increase [AAPC=1.76, 95% confidence interval (*CI*): 1.63, 1.87]. Age-related hearing loss and falls dominated YLDs. IHD accounted for 26.20% of deaths in the 90+ age group, whereas ADOD accounted for 13.24%.

**Conclusion:** The evolving disease burden among older Chinese adults is increasingly dominated by nonfatal health loss and shows distinct patterns across age subgroups. This integrated evidence-based policy shift from disease-centered care to function-oriented strategies is essential to systematically reduce disability and promote healthy aging among the elderly population in China.

In 2023, 21% of China's population was aged 60 years and older, totaling 300 million, posing substantial public health challenges. The World Health Organization (WHO) classifies older adults into the young-old (60–74 years), middle-old (75–89 years), and oldest-old (≥90 years) (*1*), reflecting extended life expectancy and improved health status. Between 1990 and 2021, China underwent an epidemiological transition in which chronic non-communicable diseases (NCDs) replaced infectious diseases as the dominant contributors to disease burden. In 2018, the prevalence of chronic conditions in older adults was 75.8% (*2*). Moreover, in 2016, approximately 33% of China's total disease burden was attributable to individuals aged 60 and above, projected to increase to 60% by 2050 (*3*).

Current studies often treat older adults as a homogeneous group, overlooking variations in physiological capacity, disease patterns, and healthcare needs across different age groups. This limits the effectiveness of public health resource allocation and policy planning, failing to meet the growing health demands of the elderly population. Conventional burden metrics, such as mortality and incidence, remain prioritized, whereas composite indicators, such as years lived with disability (YLDs), have received insufficient attention. Such incomplete understanding of the full impact of NCDs on quality of life and long-term functional status may hinder the development of quality-focused health-service systems and evidence-based policies tailored to aging populations.

The Global Burden of Disease (GBD) 2023 dataset offers high-quality age-stratified estimates, enabling a detailed analysis of dynamic disparities in disease burden among older age strata. This study utilized the GBD 2023 data to systematically examine trends in the disease spectrum among the Chinese elderly from 1990 to 2023. These findings aim to inform stratified health interventions, optimize resource allocation, and support the goals of "Healthy China 2030" in promoting healthy aging.

The GBD Study 2023 data used in this study documents incidence, prevalence, mortality, years of life lost (YLLs), YLDs, and disability-adjusted life years (DALYs) for 371 diseases and injuries across 204 countries and territories. We extracted all-cause and GBD Level 3 cause-specific mortality and YLDs data for the Chinese population aged 60 years and older, stratified by 5-year age groups. Cause-specific mortality and YLD rates were calculated for the overall elderly population (above 60 years) and for specific age strata (60–74, 75–89, and 90 years and older) based on age-specific population estimates. The 95% uncertainty intervals (*UI*s) for all key estimates were calculated using the GBD method to quantify sampling and non-sampling uncertainties. Age-standardized rates (ASRs) were calculated using the 2020 Chinese census population as the standard. The average annual percentage change (AAPC) to characterize temporal trends in the disease burden of GBD Level 3 causes between 1990 and 2023 in China. AAPC and its 95% confidence interval (*CI*) were estimated by fitting piecewise log-linear regression models using the Joinpoint Regression Program (version 5.0.2; National Cancer Institute, Rockville, MD, US) (*4*). Additional statistical analyses and data visualizations were performed using the R software (version 4.3.2; R Foundation for Statistical Computing, Vienna, Austria). Significance level was set at 0.05.

Between 1990 and 2023, all-cause mortality rate (MR) per 100,000 among Chinese adults aged 60 years and older declined from 5,182.90 (95% *UI*: 4,677.19, 5,697.50) to 3034.53 (2,482.67, 3,614.91); YLD rate per 100,000 increased slightly from 23,195.01 (17,821.15, 29,528.87) to 23,510.68 (18,111.90, 29,900.34). Significant shifts were observed in the cause-specific mortality and disability patterns (Table 1). In 1990, the leading causes of death were stroke, chronic obstructive pulmonary disease (COPD), ischemic heart disease (IHD), stomach cancer, and hypertensive heart disease. By 2023, the top causes shifted to stroke (MR=619.53/100,000; 478.17–773.06), IHD (MR=605.01/100,000; 468.76–748.25), COPD (MR=324.76/100,000; 230.53–495.15), tracheal, bronchus, and lung cancer (MR=213.26/100,000; 161.96–264.30), and Alzheimer's disease and other dementias (ADOD) (MR=196.86/100,000; 47.30–490.71). ADOD-related mortality showed a remarkable increase, with an AAPC of 1.76 (95% *CI*: 1.63, 1.87). IHD mortality showed a modest increase, with an AAPC of 0.30 (0.19, 0.40). Age-related and other hearing loss (AOHL) and falls remained the top two causes of YLDs throughout the study period (2,833.58 and 2,245.49 per 100,000 in 2023, respectively). Substantial annual increases in YLD rates were also observed for ADOD; atrial fibrillation; and flutter, falls, and anxiety disorders.

ASRs of mortality decreased for most leading causes, whereas ASRs of YLDs rose (Figure 1). Mortality trends changed from 1990 to 2010 and stabilized thereafter. Stroke, IHD, and COPD consistently ranked as the top three mortality causes, each showing significant declines in ASRs of mortality. Contrarily, diabetes and falls rose in rank, and pancreatic cancer entered the top 15 causes by 2023 (AAPC=0.15; 0.07, 0.23). The overall disability burden remained relatively stable, with significant reductions in ASRs of YLDs for low back pain, blindness, and vision loss.

Notable age-specific disparities were observed (Figure 2). Stroke-related deaths declined across all age strata, while IHD-related deaths increased among those aged 90 and above, accounting for 26.20% of deaths in 2023. ADOD-related deaths were increasingly common with advancing age, representing 13.24% in the 90 and above age strata. Tracheal, bronchus, and lung cancer mortality proportions increased substantially in the 60–74 age strata. Diabetes-related mortality was significant in the 60–74 strata. Falls were prominent among those aged over 90. Regarding disability, AOHL dominated in the 60–89 age group, while ADOD was the primary cause in those above 90 years. Blindness and vision loss accounted for an

TABLE 1. Rates of mortality and YLDs from the top 20 GBD Level 3 causes among older adults aged over 60 in China in 1990 and 2023, and the AAPC from 1990 to 2023.

| Level 3 causes | 1990 (95% *UI*) | 2023 (95% *UI*) | AAPC (95% *CI*) |
|---|---|---|---|
| Mortality (/100,000) | | | |
| Stroke | 1,662.47 (1,359.42, 2,000.30) | 619.53 (478.17, 773.06) | –2.84 (–2.94, –2.75) |
| Ischemic heart disease | 560.36 (443.07, 684.41) | 605.01 (468.76, 748.25) | 0.30 (0.19, 0.40) |
| Chronic obstructive pulmonary disease | 610.53 (396.25, 823.65) | 324.76 (230.53, 495.15) | –1.87 (–1.94, –1.80) |
| Tracheal, bronchus, and lung cancer | 212.92 (175.11, 285.13) | 213.26 (161.96, 264.30) | 0.11 (0.008, 0.22) |
| Alzheimer’s disease and other dementias | 116.78 (26.54, 332.33) | 196.86 (47.30, 490.71) | 1.76 (1.63, 1.87) |
| Stomach cancer | 283.80 (223.31, 361.92) | 102.23 (73.23, 137.40) | –2.95 (–3.04, –2.86) |
| Hypertensive heart disease | 242.15 (136.36, 347.86) | 97.03 (58.42, 132.08) | –2.65 (–2.79, –2.50) |
| Esophageal cancer | 168.78 (124.30, 204.11) | 70.26 (53.60, 89.86) | –2.52 (–2.61, –2.42) |
| Colon and rectum cancer | 81.48 (67.03, 98.46) | 67.32 (52.57, 86.64) | –0.51 (–0.61, –0.41) |
| Diabetes mellitus | 53.17 (38.40, 70.95) | 50.87 (36.41, 67.72) | –0.05 (–0.16, 0.08) |
| Lower respiratory infections | 109.98 (80.25, 146.30) | 50.79 (35.76, 69.63) | –2.28 (–2.44, –2.12) |
| Chronic kidney disease | 71.46 (48.68, 106.48) | 42.89 (32.12, 55.00) | –1.45 (–1.55, –1.35) |
| Falls | 27.21 (18.63, 38.67) | 35.24 (17.39, 52.92) | 0.92 (0.80, 1.03) |
| Pancreatic cancer | 27.51 (23.06, 33.26) | 29.98 (23.60, 37.80) | 0.35 (0.26, 0.43) |
| Liver cancer | 45.09 (36.92, 55.19) | 29.83 (23.48, 37.20) | –1.18 (–1.28, –1.09) |
| Parkinson’s disease | 26.85 (21.84, 34.54) | 27.05 (20.57, 35.03) | 0.15 (0.02, 0.27) |
| Cirrhosis and other chronic liver diseases | 78.72 (57.20, 107.43) | 24.79 (18.47, 32.47) | –3.36 (–3.44, –3.28) |
| Road injuries | 57.55 (30.61, 89.54) | 22.44 (13.28, 31.16) | –2.76 (–2.85, –2.66) |
| Atrial fibrillation and flutter | 18.83 (14.12, 23.47) | 21.62 (15.93, 27.99) | 0.41 (0.29, 0.54) |
| Self–harm | 54.42 (37.32, 73.26) | 17.33 (12.55, 24.68) | –3.40 (–3.49, –3.30) |
| YLDs (/100,000) | | | |
| Age–related and other hearing loss | 2,585.00 (1,749.22, 3,524.33) | 2,833.58 (1,960.10, 3,896.06) | 0.28 (0.27, 0.29) |
| Falls | 1,665.96 (1,216.38, 2,206.09) | 2,245.49 (1,615.92, 3,094.28) | 0.94 (0.87, 1.01) |
| Low back pain | 1,966.39 (1,239.35, 2,905.04) | 1,459.29 (926.52, 2,161.41) | –0.91 (–0.93, –0.88) |
| Blindness and vision loss | 1,827.71 (1,274.65, 2,546.74) | 1,326.94 (895.15, 1,923.53) | –0.95 (–0.98, –0.92) |
| Alzheimer’s disease and other dementias | 746.34 (498.85, 1,041.76) | 1,302.14 (879.37, 1,793.91) | 1.74 (1.69, 1.80) |
| Stroke | 1,067.81 (734.33, 1,440.51) | 1,188.44 (838.22, 1,599.40) | 0.33 (0.32, 0.34) |
| Diabetes mellitus | 948.29 (658.38, 1,300.68) | 1,159.55 (807.65, 1,579.57) | 0.62 (0.57, 0.68) |
| Osteoarthritis | 928.96 (449.58, 1,973.99) | 1,120.02 (535.68, 2,384.60) | 0.58 (0.56, 0.61) |
| Depressive disorders | 765.19 (528.40, 1,064.38) | 849.04 (571.17, 1,152.66) | 0.34 (0.26, 0.44) |
| Oral disorders | 818.23 (499.39, 1,230.32) | 808.95 (509.72, 1,183.96) | –0.01 (–0.05, 0.02) |
| Ischemic heart disease | 511.52 (333.71, 746.48) | 653.51 (424.69, 962.21) | 0.74 (0.68, 0.79) |
| Chronic obstructive pulmonary disease | 632.65 (505.08, 787.01) | 574.44 (441.32, 729.83) | –0.30 (–0.31, –0.28) |
| Neck pain | 507.12 (258.37, 866.88) | 548.59 (281.91, 929.12) | 0.24 (0.23, 0.26) |
| Headache disorders | 473.01 (327.90, 675.77) | 487.40 (332.52, 686.22) | 0.08 (0.07, 0.09) |
| Anxiety disorders | 342.89 (217.69, 509.18) | 466.25 (283.16, 760.00) | 0.91 (0.86, 0.96) |
| Chronic kidney disease | 411.10 (275.04, 583.41) | 408.25 (266.47, 588.83) | 0.07 (0.01, 0.13) |
| Road injuries | 353.11 (259.83, 464.90) | 310.06 (224.97, 410.88) | –0.38 (–0.40, –0.36) |
| Schizophrenia | 263.70 (194.86, 341.29) | 257.06 (187.07, 330.50) | –0.08 (–0.09, –0.07) |
| Atrial fibrillation and flutter | 186.90 (112.58, 294.81) | 255.84 (154.72, 402.54) | 0.99 (0.92, 1.07) |
| Gallbladder and biliary diseases | 282.07 (179.61, 426.63) | 243.04 (153.94, 362.08) | –0.35 (–0.46, –0.21) |

Abbreviation: YLDs=years lived with disability; GBD=global burden of disease; AAPC=average annual percentage change; *CI*=confidence interval; *UI*=uncertainty interval.

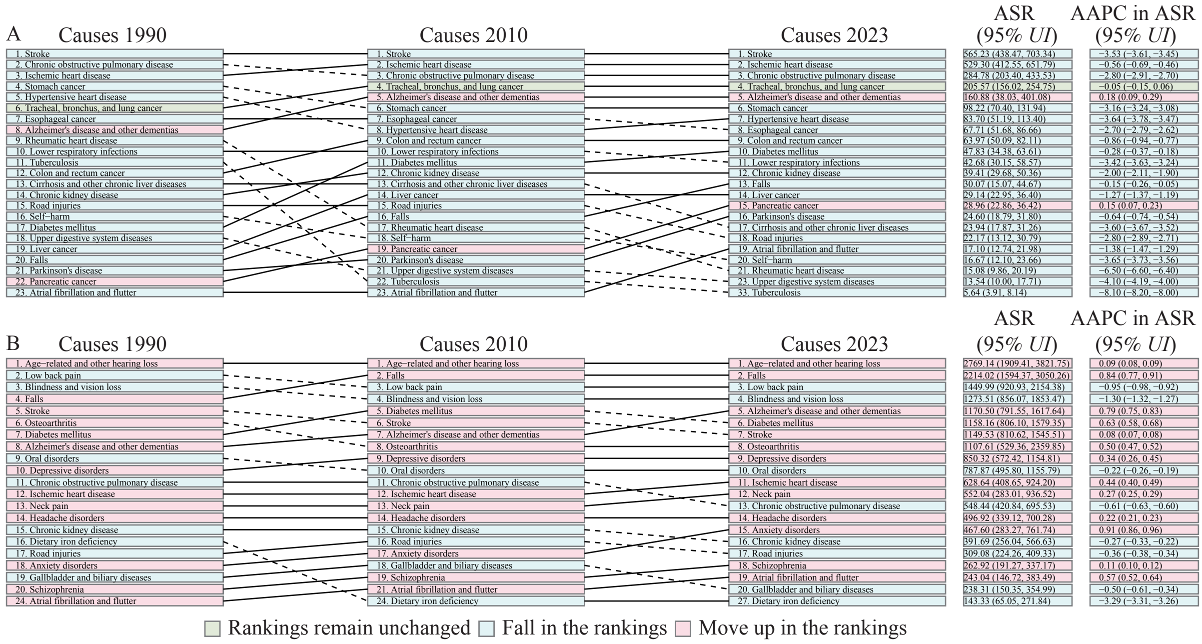


FIGURE 1. Rankings of the top 20 Level 3 causes from the GBD Study by ASR of (A) mortality and (B) YLDs among older adults in China, 1990–2023, with their corresponding AAPCs.
Abbreviation: GBD=global burden of disease; YLDs=years lived with disability; ASR=age-standardized rate; AAPC=average annual percentage change.

increasing share of YLDs with increasing age. IHD contributed substantially to disability among adults aged 75 and above.

## DISCUSSION

This study systematically analyzed trends in mortality and disability among adults aged 60 years and above in China from 1990 to 2023. Results indicated a marked decline in all-cause MR, while the burden of disability, measured by YLDs, remained largely unchanged, highlighting the complex challenges of promoting healthy aging in rapidly aging societies.

The substantially reduced ASR of all-cause mortality in China exceeded the average decline observed in many middle- and low-income countries (*5*). This likely reflects substantial advances in China's health system driven by socioeconomic development, expanded health coverage, improved risk factor management (e.g., hypertension), and progress in medical technology. Throughout the study period, stroke, IHD, and COPD remained the top three causes of death, while tracheal, bronchus, and lung cancer and ADOD rose to fourth and fifth places, respectively. The rising crude IHD mortality, alongside a falling age-standardized rate, indicates population aging as the main driver, alongside gains in the effectiveness of cardiovascular disease control among older adults. The persistence of COPD is a distinctive feature of the disease burden in China. ASR of mortality due to ADOD increased significantly, consistent with global trends in cognitive disorders, emphasizing the challenge posed by China's accelerated aging population (*6*).

Contrary to the declining MR, the YLD rate increased slightly, suggesting that a longer life expectancy is accompanied by more years spent with disability and functional impairment, posing ongoing challenges for families and healthcare systems. AOHL and falls consistently lead to the disability burden. Substantial increases in YLD rates were notable for ADOD, falls, atrial fibrillation and flutter, and anxiety disorders, indicating that sensory, musculoskeletal, cognitive, mental, and cardiovascular impairments contribute to disability in older age, consistent with previous studies (*7*–*10*).

Age-stratified analyses revealed substantial heterogeneity across the age groups. The proportion of ADOD-related deaths increased steeply with age. Among adults aged 90 years and above, IHD surpassed stroke as the leading cause of death in 2023, with falls also becoming a major cause. This may be partly attributable to a competing risk effect, whereby successful stroke prevention increases survival at

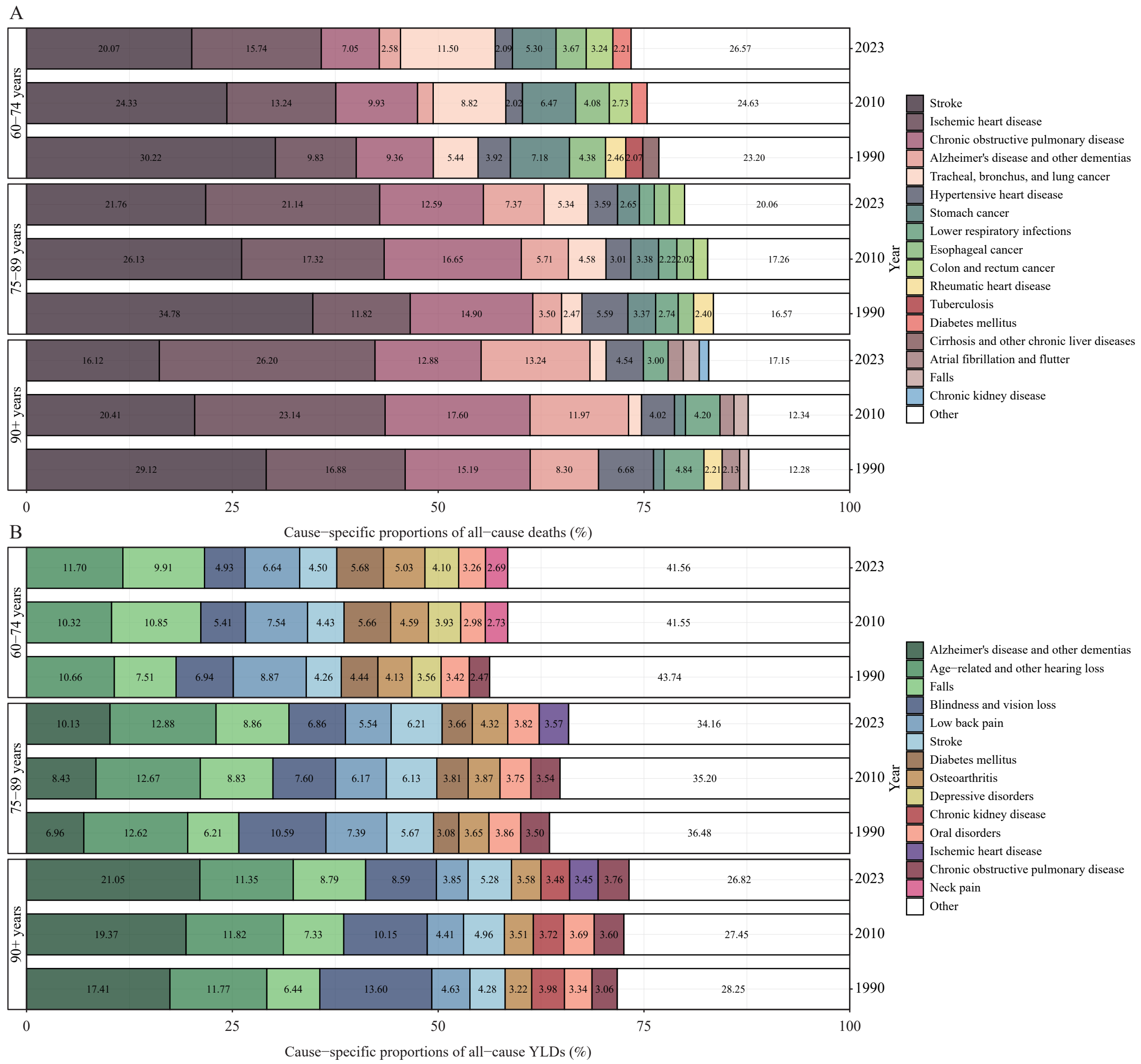


FIGURE 2. Cause-specific proportions of (A) all-cause deaths and (B) YLDs for the top 10 GBD Level 3 causes among older adults in China in 1990, 2010, and 2023.
Abbreviation: YLDs=years lived with disability; GBD=global burden of disease.

advanced ages, exposing the underlying risks of cardiovascular and cognitive diseases. Regarding disability, AOHL was the leading cause in those aged 60–89, and ADOD in those aged 90 years and older. Low back pain and IHD were prominent contributors to YLDs in the 60–74 and 75+ strata, respectively. A pronounced increase in lung cancer mortality was observed in adults aged 60–74 years old. Age-differentiated health strategies, including targeting chronic diseases and musculoskeletal conditions in the young-old, strengthening cardiovascular and cognitive care in the middle-old and old-old, and prioritizing IHD, ADOD, and fall prevention in the oldest-old, are important.

Limitations include reliance on modeled estimates, which require cautious interpretation, and the lack of subgroup analyses by sex, region, or urban–rural residence, possibly masking important disparities. Additionally, adopting a single-disease analytical framework failed to account for the prevalence of multimorbidity among older adults. Behavioral, social, and environmental determinants of disease burden have also not been fully explored.

In conclusion, despite significant reductions in mortality, China continues to face the dual challenges of a persistent chronic disease burden and rising disability among older adults. Therefore, health policies transition from a disease-centered model to a function-oriented approach, focusing on establishing an integrated elderly health service system. Building on existing policies, establishing of a community-based hierarchical health management pathway centered on family physicians is recommended. First, a comprehensive geriatric assessment should be incorporated as a standardized component of basic elderly health services under family physician contracts, facilitating early identification and systematic health evaluation. Second, a dynamic risk-stratification mechanism should be established at the community level. For common geriatric risks, such as ADOD, AOHL, falls, and COPD, personalized intervention packages can be activated, including balance training, home modification guidance, and pulmonary rehabilitation. Finally, seamlessly integrating community and specialist care is essential. High-risk patients should receive expedited referrals to appropriate hospital specialties, with subsequent management and follow-up responsibilities returned to the family physician team. This pathway systematically integrates chronic disease management, disability prevention, and rehabilitation into a continuous life-cycle health management model. Moreover, differentiated intervention strategies tailored to predominant health threats in specific age groups are crucial to systematically delay functional decline and reduce the overall burden of disease and disability among aging populations.

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Preplanned Studies

# Burden and Risk Factors of Gout, Low Back Pain, Osteoarthritis, and Rheumatoid Arthritis — China, 1990–2023

Kun Xu[1]; Feng Pan[1]; Kunzhi Zhu[1]; Yuan Gao[1]; Jun Zhang[1,#]

**Summary**

**What is already known on this topic?**

Musculoskeletal disorders, including gout, low back pain (LBP), osteoarthritis (OA), and rheumatoid arthritis (RA), impose a substantial global health burden that intensifies with population aging. China confronts distinctive challenges stemming from rapid demographic aging and evolving occupational patterns, yet comprehensive analysis using the latest Global Burden of Disease (GBD) 2023 data to inform long-term prevention strategies remains absent.

**What is added by this report?**

This study demonstrates that from 1990 to 2023, the disease burdens of gout, OA, and RA increased continuously, whereas the burden of LBP declined. Predictive modeling indicates these divergent trajectories — growth for gout, OA, and RA versus reduction for LBP — will persist through 2043. Additionally, substantial gender- and age-specific variations in disease burden were identified, with peak impacts concentrated in the 40–80 age range.

**What are the implications for public health practice?**

The rising burden of these musculoskeletal diseases, concentrated in the 40–80 age group, necessitates urgent interventions aligned with "Healthy China 2030" objectives. Key priorities must include managing modifiable risk factors (body mass index, occupational ergonomics), implementing targeted screening programs for high-risk populations (males for gout, females for osteoarthritis and rheumatoid arthritis), and optimizing hierarchical diagnosis and rehabilitation systems to mitigate long-term disability.

## ABSTRACT

**Introduction:** Musculoskeletal diseases including gout, low back pain (LBP), osteoarthritis (OA), and rheumatoid arthritis (RA) impose a substantial health burden in China. This study analyzes disease trends from 1990 to 2023 and projects trends over the next 20 years to inform evidence-based prevention and management strategies.

**Methods:** The study utilized Global Burden of Disease (GBD) 2023 data to assess the burden of gout, LBP, OA, and RA. Temporal trends were evaluated using annual percentage change (APC) and estimated annual percentage change (EAPC), with systematic stratification by gender, age, and risk factors. The Autoregressive Integrated Moving Average (ARIMA) model was employed to forecast future disease rates.

**Results:** In 2023, China's prevalence cases for gout, LBP, OA, and RA were 17.67, 95.32, 161.74, and 4.99 million, respectively. From 1990 to 2023, the burden of gout, OA, and RA increased substantially, while LBP declined. Gout burden was higher in males, whereas LBP, OA, and RA were higher in females, with disease concentration in the 40–80 age group. Disability-adjusted life years (DALYs) attributable to high body mass index (BMI) increased for gout, OA, and LBP. ARIMA projections indicate continued increases for gout, OA, and RA, but improvement for LBP.

**Conclusion:** The burden of gout, OA, and RA in China increased from 1990 to 2023, while LBP demonstrated improvement. Significant variations exist across gender and age groups. Strengthening health education and implementing comprehensive risk factor prevention strategies are crucial to reduce the future burden of these diseases.

Musculoskeletal disorders — damage to muscles, bones, joints, and connective tissues — cause functional limitations ranging from short-term disability to lifelong impairment. Globally, the prevalence of musculoskeletal disorders has increased substantially, imposing considerable economic and physical burdens on healthcare systems and individuals. Key risk factors include prolonged physical labor, repetitive movements, poor posture, elevated body mass index (BMI), and inadequate rest periods. Aging represents a critical determinant, as the incidence of musculoskeletal disorders increases progressively with advancing age (*1*).

The Global Burden of Disease 2023 (GBD 2023) study provides comprehensive epidemiological data — including incidence, prevalence, and disability-adjusted life years (DALYs) — on musculoskeletal diseases across 204 countries and territories from 1990 to 2023, offering an invaluable analytical framework for public health research. China, the world's second most populous nation, faces distinctive challenges related to rapid demographic aging and evolving occupational exposures (*2*). Understanding the burden and epidemiological trends of musculoskeletal diseases in China is therefore essential for developing evidence-based public health strategies and resource allocation policies.

Leveraging GBD 2023 data, this study comprehensively analyzed the incidence, prevalence, and DALYs associated with gout, low back pain (LBP), osteoarthritis (OA), and rheumatoid arthritis (RA) in China from 1990 to 2023. We examined temporal trends and distribution patterns by gender and age group, evaluated associated risk factors, and projected future disease burdens. This research aims to elucidate the epidemiological characteristics of these four major musculoskeletal conditions in China, providing critical evidence to inform prevention strategies and clinical management policies.

Data were obtained from the GBD 2023 dataset, covering 375 diseases and 88 risk factors in 204 countries and territories. We extracted incidence, prevalence, DALYs, and age-standardized rates (ASRs) gor gout, LBP, OA, and RA in China from the global health data exchange (GHDx) platform. This study followed Guidelines for accurate and transparent health estimates reporting (GATHER) and required no ethical approval, as no personal or sensitive data was used (*3*).

Disease burden was assessed via incidence, prevalence, and DALYs (measuring life loss/disability). We used Joinpoint regression (version 5.0.2, National Cancer Institute, Bethesda, United States) to identify significant trend changes, calculating the Annual Percentage Change (APC). Time patterns were quantified using the Estimated Annual Percentage Change (EAPC), with trend direction determined by its 95% confidence interval (*CI*). We analyzed disease distribution by gender and 17 age groups and assessed risk factors contributing to DALYs. Future burden was predicted using the Autoregressive Integrated Moving Average (ARIMA) model, selected for its high accuracy and widely utilized in relevant epidemiological research (*4*).

In 2023, China recorded 3.22, 41.38, 11.89, and 0.26 million incident cases of gout, LBP, OA, and RA, respectively, corresponding to age-standardized incidence rates (ASIRs) of 151.27, 2,164.80, 550.20, and 13.84 per 100,000 population. Prevalent cases totaled 17.67, 95.32, 161.74, and 4.99 million, with age-standardized prevalence rates (ASPRs) of 809.69, 4,929.78, 6989.96, and 241.73 per 100,000, respectively. The age-standardized DALYs rates (ASDRs) were 25.14, 551.92, 243.86, and 40.23 per 100,000 for gout, LBP, OA, and RA, respectively. Overall, China experiences a substantial musculoskeletal disease burden, with the burden being highest for LBP and lowest for RA (Table 1).

From 1990 to 2023, the ASIR for gout, OA, and RA in China demonstrated increasing trends, with EAPCs of 0.98% (95% *CI*: 0.87%, 1.09%), 0.56% (95% *CI*: 0.49%, 0.64%), and 0.62% (95% *CI*: 0.59%, 0.64%), respectively. In contrast, the ASIR for LBP exhibited a decreasing trend (EAPC=−0.51%, 95% *CI*: −0.60%, −0.43%) (Table 1). Joinpoint regression analysis revealed an overall upward ASIR trajectory for gout from 1990 to 2023, although a decline occurred during 1990–1994 (APC=−1.24%). The ASIR for LBP showed an overall decline, most pronounced during 1990–1994 (APC=−3.23%), yet increased during 2014–2020 (APC=0.30%). The ASIR for OA followed a generally upward trajectory, with a notable decrease during 1990–1994 (APC=−0.55%). Similarly, the ASIR for RA demonstrated an overall upward trend, with the most substantial increase occurring during 2000–2009 (APC=0.84%) (Figure 1).

From 1990 to 2023, China's ASPR increased for gout (EAPC=1.08%, 95% *CI*: 0.96%, 1.19%), OA (EAPC=0.59%, 95% *CI*: 0.51%, 0.66%), and RA (EAPC=0.58%, 95% *CI*: 0.55%, 0.62%), while decreasing for LBP (EAPC=−0.54%, 95% *CI*: −0.64%, −0.45%) (Table 1). Joinpoint analysis revealed an overall upward trend in ASPR for gout, although a decline occurred during 1990–1994 (APC=−1.37%). LBP ASPR declined overall, with the steepest decrease

TABLE 1. Incidence, prevalence, and DALYs rates of gout, low back pain, osteoarthritis, and rheumatoid arthritis in China, 1990–2023.

| Diseases | 1990 | | 2023 | | |
|---|---|---|---|---|---|
| | Number (95% *UI*) | ASR (95% *UI*) | Number (95% *UI*) | ASR (95% *UI*) | EAPC (95% *CI*) |
| Incidence | | | | | |
| Gout | 1,188,962 (949,192, 1,476,316) | 122.47 (98.09, 153.00) | 3,215,472 (2,529,611, 4,037,875) | 151.27 (120.46, 189.12) | 0.98 (0.87, 1.09) |
| Low back pain | 29,989,124 (26,335,876, 33,418,905) | 2,859.73 (2,532.11, 3,187.09) | 41,383,565 (36,417,179, 46,520,393) | 2,164.80 (1,926.65, 2,383.57) | −0.51 (−0.60, −0.43) |
| Osteoarthritis | 4,675,941 (4,110,513, 5,229,759) | 487.11 (429.80, 545.72) | 11,895,272 (10,472,533, 13,375,467) | 550.20 (486.92, 616.09) | 0.56 (0.49, 0.64) |
| Rheumatoid arthritis | 128,308 (112,655, 147,427) | 11.59 (10.23, 13.22) | 257,758 (225,232, 294,722) | 13.84 (12.27, 15.78) | 0.62 (0.59, 0.64) |
| Prevalence | | | | | |
| Gout | 6,008,711 (4,795,809, 7,613,438) | 640.47 (511.00, 801.13) | 17,672,308 (13,878,800, 22,353,430) | 809.69 (647.27, 1,009.55) | 1.08 (0.96, 1.19) |
| Low back pain | 68,636,309 (59,816,847, 77,457,397) | 6,636.60 (5,778.62, 7,462.02) | 95,323,956 (83,625,063, 107,778,790) | 4,929.78 (4,304.39, 5,494.10) | −0.54 (−0.64, −0.45) |
| Osteoarthritis | 53,766,775 (47,130,666, 59,642,801) | 6,149.80 (5,441.26, 6,801.46) | 161,742,448 (142,905,114, 180,660,772) | 6,989.96 (6,196.45, 7,784.64) | 0.59 (0.51, 0.66) |
| Rheumatoid arthritis | 2,052,564 (1,755,880, 2,383,913) | 205.75 (179.74, 238.28) | 4,985,071 (4,389,031, 5,800,940) | 241.73 (211.74, 280.44) | 0.58 (0.55, 0.62) |
| DALYs | | | | | |
| Gout | 188,934 (125,368, 268,975) | 19.88 (13.26, 28.28) | 545,814 (363,327, 779,105) | 25.14 (16.72, 35.52) | 1.07 (0.95, 1.18) |
| Low back pain | 7,732,428 (5,438,615, 10,477,031) | 740.83 (525.01, 1,010.60) | 10,635,869 (7,520,420, 14,715,745) | 551.92 (388.90, 750.82) | −0.54 (−0.63, −0.44) |
| Osteoarthritis | 1,837,689 (883,100, 3,937,170) | 209.87 (100.56, 446.71) | 5,648,544 (2,670,356, 12,144,957) | 243.86 (115.42, 525.12) | 0.66 (0.58, 0.73) |
| Rheumatoid arthritis | 421,031 (301,535, 542,686) | 43.91 (31.23, 56.56) | 837,301 (621,306, 1,074,013) | 40.23 (29.58, 52.40) | −0.22 (−0.27, −0.16) |

Abbreviation: *CI*=confidence interval; *UI*=uncertainty interval; DALYs=disability-adjusted life years; ASR=age-standardized rate; EAPC= estimated annual percentage change.

during 1990–1994 (APC=–3.63%), followed by a modest increase during 2014–2020 (APC=0.34%). OA ASPR demonstrated an upward trajectory, with an initial decline during 1990–1994 (APC=–0.57%). Similarly, RA ASPR increased overall, with the most pronounced rise occurring during 2000–2010 (APC=0.90%) (Supplementary Figure S1, available athttps://weekly.chinacdc.cn/).

From 1990 to 2023, ASDR increased for gout (EAPC=1.07%) and OA (EAPC=0.66%), but decreased for LBP (EAPC=–0.54%) and RA (EAPC= –0.22%) (Table 1). Joinpoint analysis demonstrated overall ASDR increases for gout and OA, with initial declines during 1990–1994 (APC=–1.26%) and 1990–1993 (APC=–0.63%), respectively. LBP ASDR exhibited an overall decline, most pronounced during 1990–1994 (APC=–3.58%), yet increased during 2014–2020 (APC=0.40%). RA ASDR fluctuated throughout the study period, with the greatest decrease occurring during 1990–1998 (APC=–0.84%) and the most substantial increase during 1998–2005 (APC=0.55%) (Supplementary Figure S2, available at https://weekly.chinacdc.cn/).

In 2023, gout incidence and prevalence in China peaked in the 95+ age group and increased progressively with age. The gout burden was substantially higher in men, with cases peaking in the 55–59 age group (Figure 2A, Supplementary Figure S3, available at https://weekly.chinacdc.cn/). Conversely, LBP, OA, and RA imposed a considerably greater burden on women. OA incidence peaked in the 50-54 age group, whereas LBP and RA incidence, along with prevalence for all three conditions, peaked in the 55–59 age group (Figure 2, Supplementary Figure S3). DALYs demonstrated comparable age and sex distribution patterns (Supplementary Figure S4, available at https://weekly.chinacdc.cn/). Overall, the disease burden for these musculoskeletal conditions was concentrated in the 40–80 age group.

In China, elevated BMI and impaired renal function represent the primary risk factors contributing to gout-related DALYs. Between 1990 and 2023, the proportion of gout DALYs attributable to high BMI increased substantially, whereas the contribution from impaired renal function remained relatively stable (Figure 3A). For LBP, occupational ergonomic factors

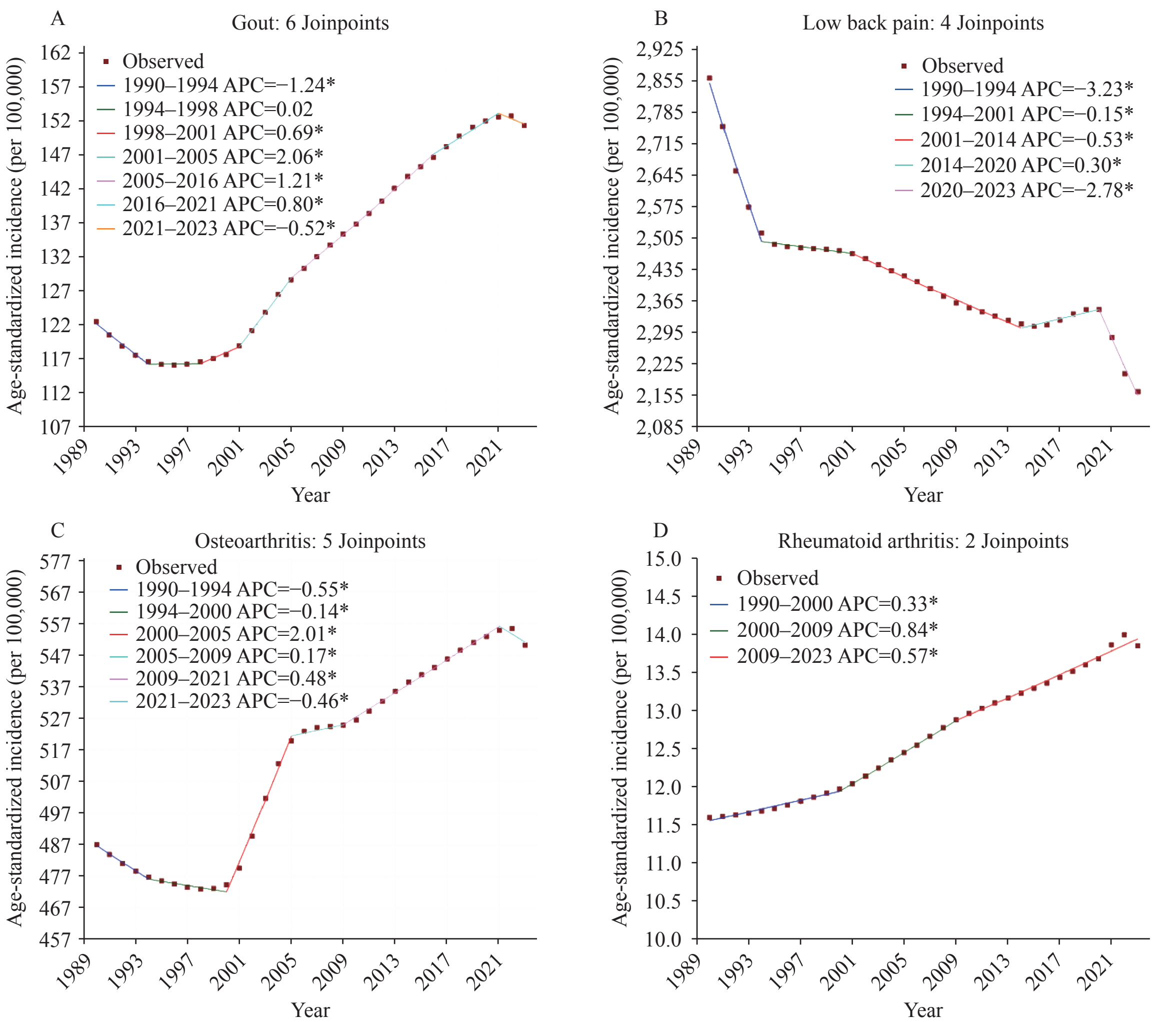


FIGURE 1. Trends of age-standardized incidence in gout, low back pain, osteoarthritis, and rheumatoid arthritis in China from 1990 to 2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.
Abbreviation: APC=annual percentage change.
* *P*<0.05 indicates that the average annual rate of change during this period was significant.

constituted the largest contributor to DALYs, followed by elevated BMI and smoking. During this same period, the contribution of occupational factors declined, while smoking-attributable DALYs increased progressively (Figure 3B). Elevated BMI emerged as a major risk factor for OA, with its proportional contribution to DALYs rising continuously throughout the study period (Figure 3C). In contrast, the proportion of RA-related DALYs attributable to smoking demonstrated a declining trend (Figure 3D).

Figures 4 and Supplementary Figures S5–S6 (available at https://weekly.chinacdc.cn/) present ARIMA model projections for China's musculoskeletal disease burden over the next 20 years, derived from GBD data. Our forecasts indicate increasing ASIR and ASPR for gout, OA, and RA, contrasted by a substantial decline in LBP rates. Similarly, ASDR is projected to rise for gout and OA while decreasing for both LBP and RA. Collectively, these projections suggest an expanding burden for gout, OA, and RA, whereas the LBP burden is expected to improve significantly.

## DISCUSSION

This study employed Joinpoint regression and ARIMA modeling to analyze long-term trends in incidence, prevalence, and DALYs for gout, LBP, OA, and RA in China, examining disease burdens across sex and age groups, associated risk factors, and future projections. Our analysis demonstrated rising age-

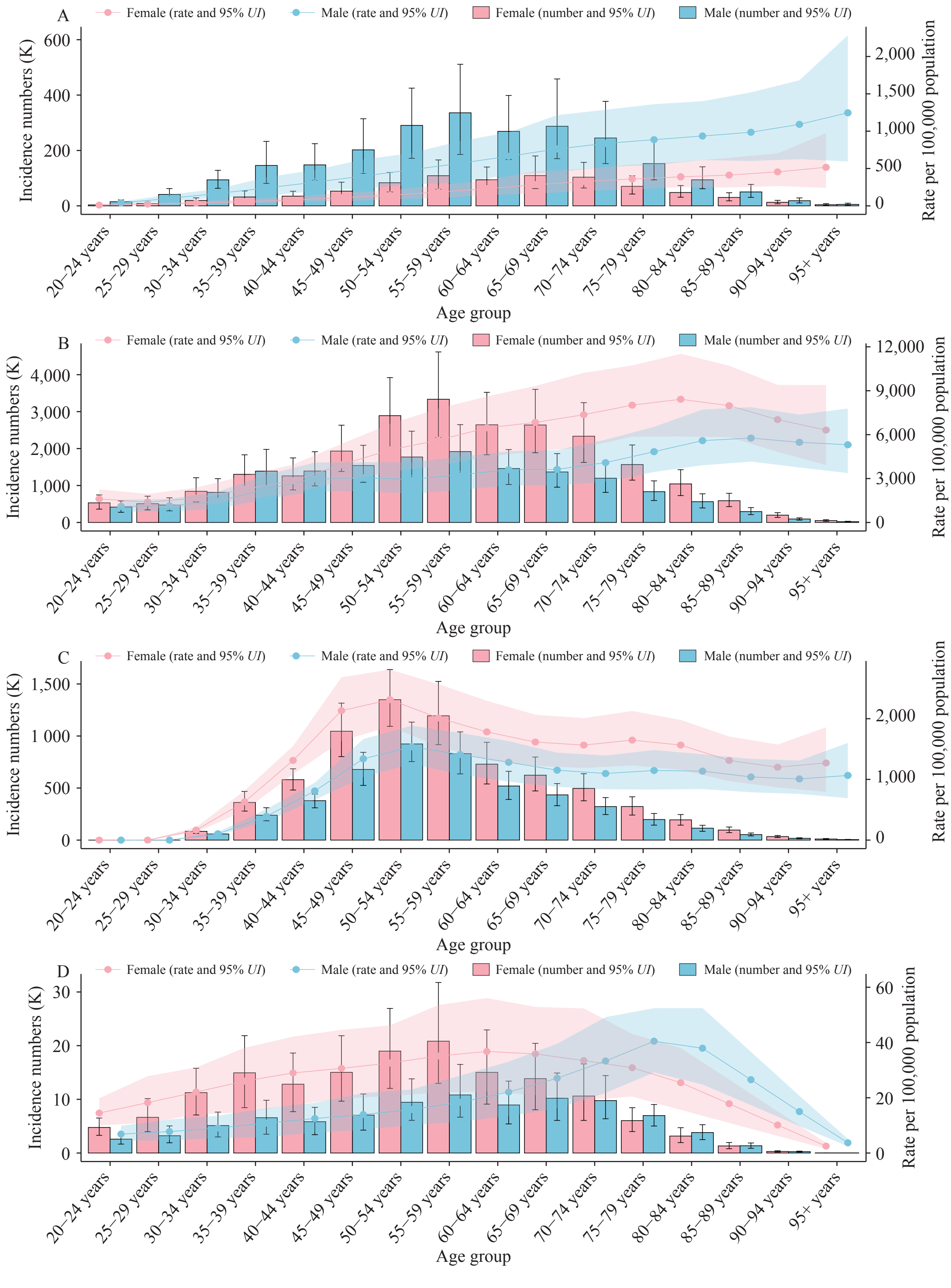


FIGURE 2. Incidence of gout, low back pain, osteoarthritis, and rheumatoid arthritis by gender and age group in China in 2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.
Abbreviation: *UI*=uncertainty interval.

standardized rates for gout, OA, and RA, whereas LBP rates declined from 1990 to 2023. These trends align with prior research and can be attributed to economic development, increasingly sedentary lifestyles, and population aging (*5*). The disease burden concentrates predominantly in the 40–80 age group, underscoring

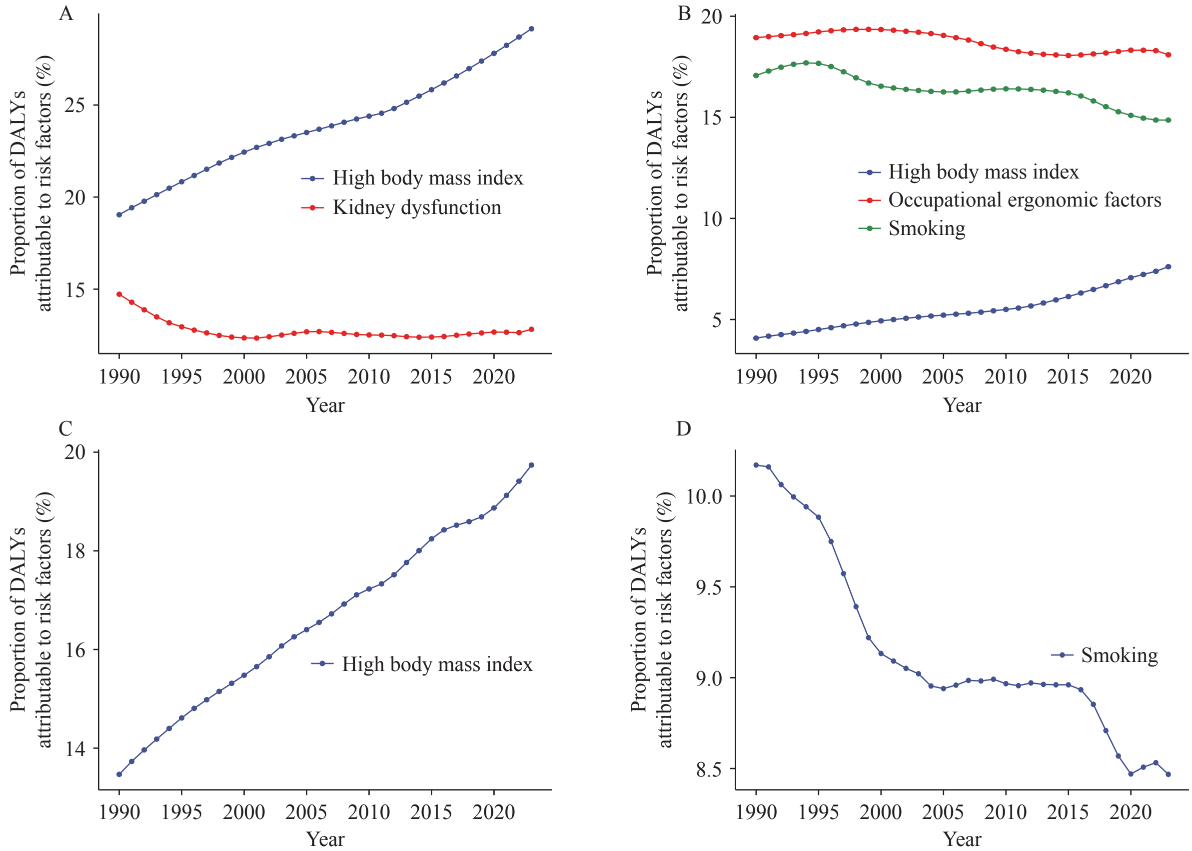


FIGURE 3. Risk factors contributing to DALYs for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China, 1990–2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.
Abbreviation: DALY=disability-adjusted life year.

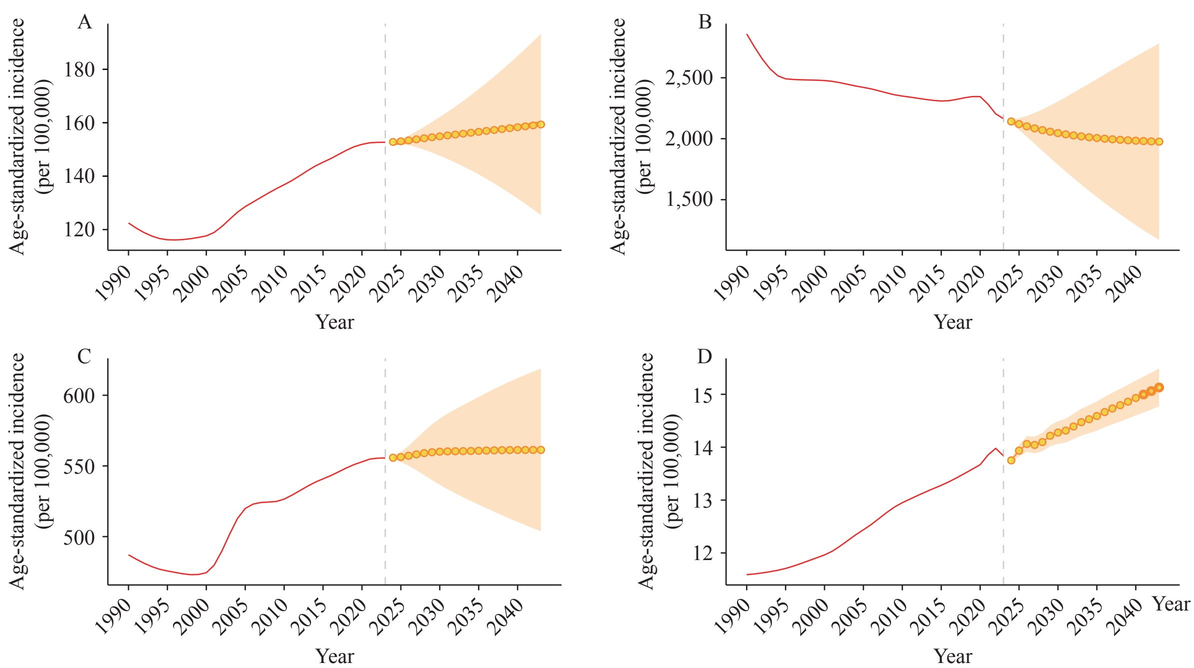


FIGURE 4. Projected age-standardized incidence rates for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China. (A) Projected results for gout; (B) Projected results for low back pain; (C) Projected results for osteoarthritis; (D) Projected results for rheumatoid arthritis.

the urgent need for age-targeted prevention policies.

Musculoskeletal disorders impose substantial burdens through pain, stiffness, reduced mobility, functional impairment, depressive symptoms, and considerable economic costs (*6*). Gout management relies on urate-lowering medications and lifestyle modifications. LBP treatment strategies encompass opioid therapy and surgical intervention, although concerns regarding overuse persist (*7*). The long-term efficacy of OA pain management remains controversial, frequently necessitating surgical intervention and emphasizing the importance of preventive approaches. RA treatment involves anti-rheumatic and analgesic medications, though their long-term risk-benefit profiles continue to be debated (*8*). Non-surgical interventions are often compromised by poor patient adherence, resulting in suboptimal outcomes. Consequently, prevention through comprehensive health education represents a critical priority.

The next 20-year projections indicate increasing burdens in ASIR, ASPR, and ASDR for gout, OA, and RA, requiring immediate policy interventions. Although LBP burden is projected to decline, it will remain substantial. These trends necessitate alignment of public health strategies with "Healthy China 2030" objectives (*9*). Future priorities should emphasize targeted interventions, including strengthening risk factor management (addressing high BMI for gout and OA; improving occupational ergonomics for LBP), enhancing national health literacy, and implementing early screening programs for high-risk populations (males for gout; females for OA and RA). Additionally, optimizing hierarchical diagnosis and treatment services for primary care management and enhancing rehabilitation systems to reduce DALYs are essential. Integrating multidisciplinary care approaches, including psychological support and long-term follow-up (*10*), should aim to reduce incidence, prevalence, and DALYs while prioritizing sustained patient management.

This results represents the most comprehensive GBD-based analysis examining the burden, risk factors, and future trends of these four musculoskeletal diseases in China. Several limitations warrant consideration: potential underestimation of intermittent gout due to GBD exclusion of asymptomatic periods; incomplete risk factor analysis limited to impaired renal function, high BMI, and smoking; static predictions that do not account for future changes in risk factors or policy interventions; and inherent GBD data collection and modeling biases. Despite these limitations, our findings provide valuable evidence to inform prevention and control strategies.

In conclusion, the burden of gout, OA, and RA in China has significantly increased, while LBP has improved, with variations by sex and age. Multifaceted strategies aligned with "Healthy China 2030" are essential. These must include strengthening health literacy and risk factor management (high BMI, occupational risks), optimizing hierarchical services for early diagnosis and chronic care, and improving rehabilitation systems to mitigate this burden.

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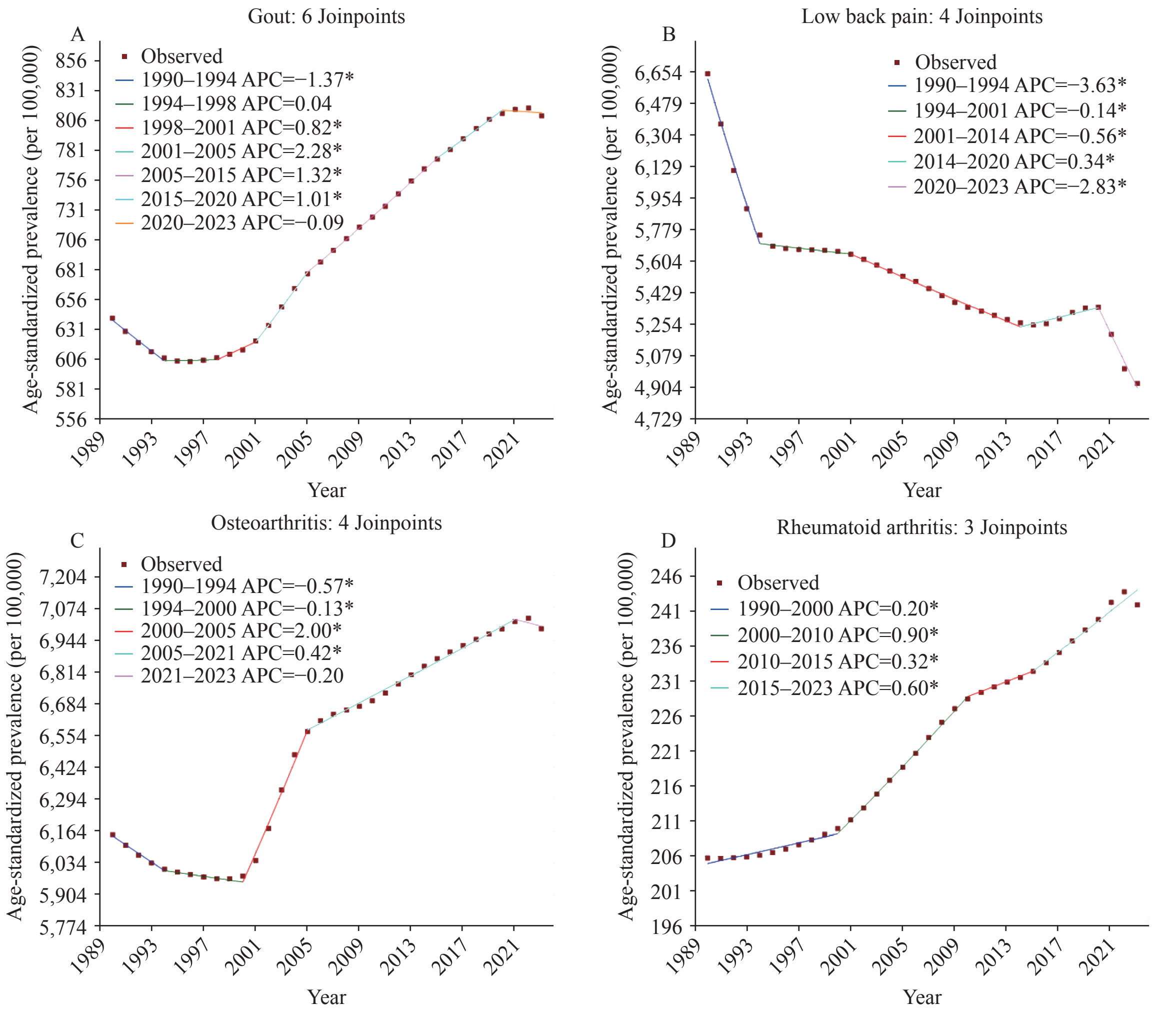
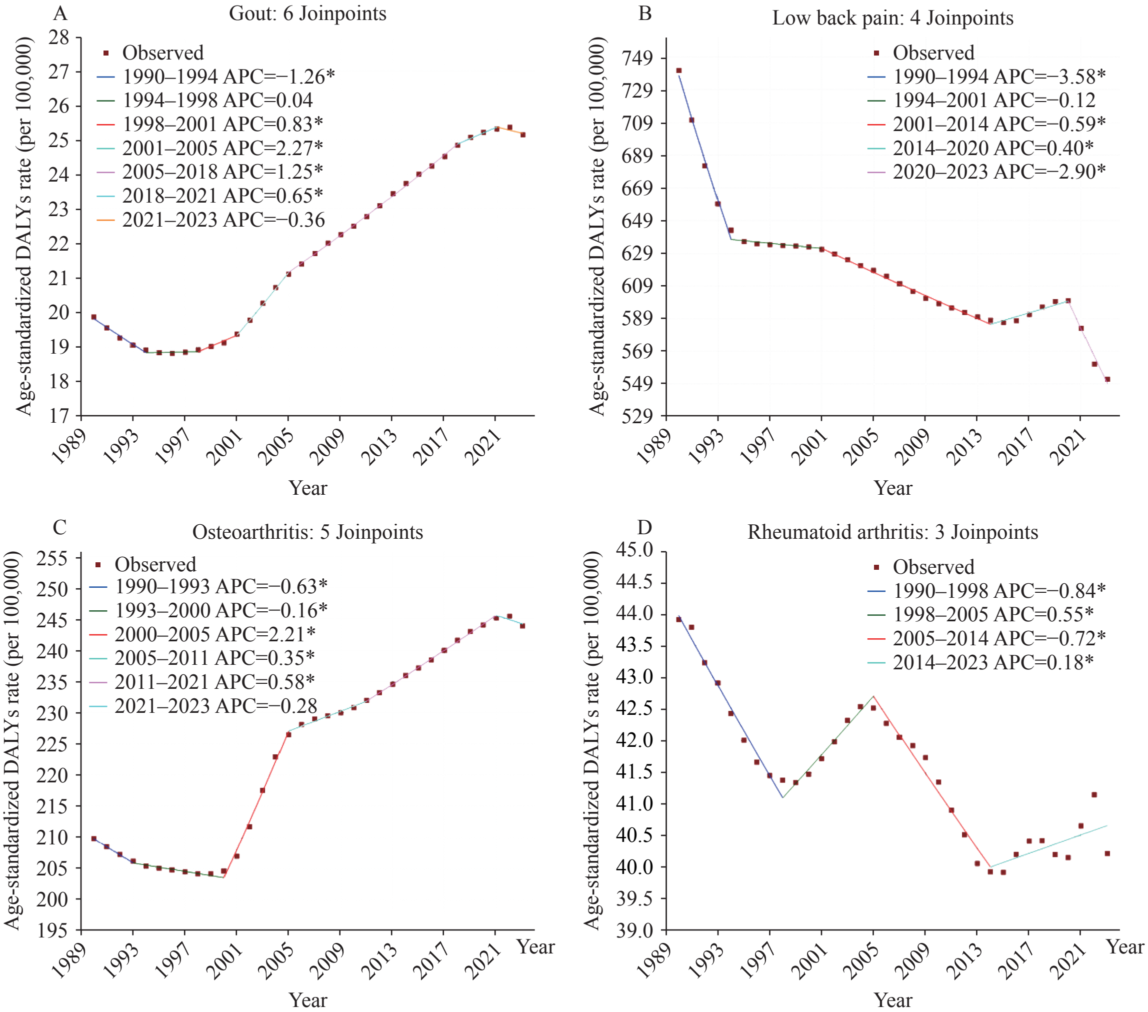
# SUPPLEMENTARY MATERIAL



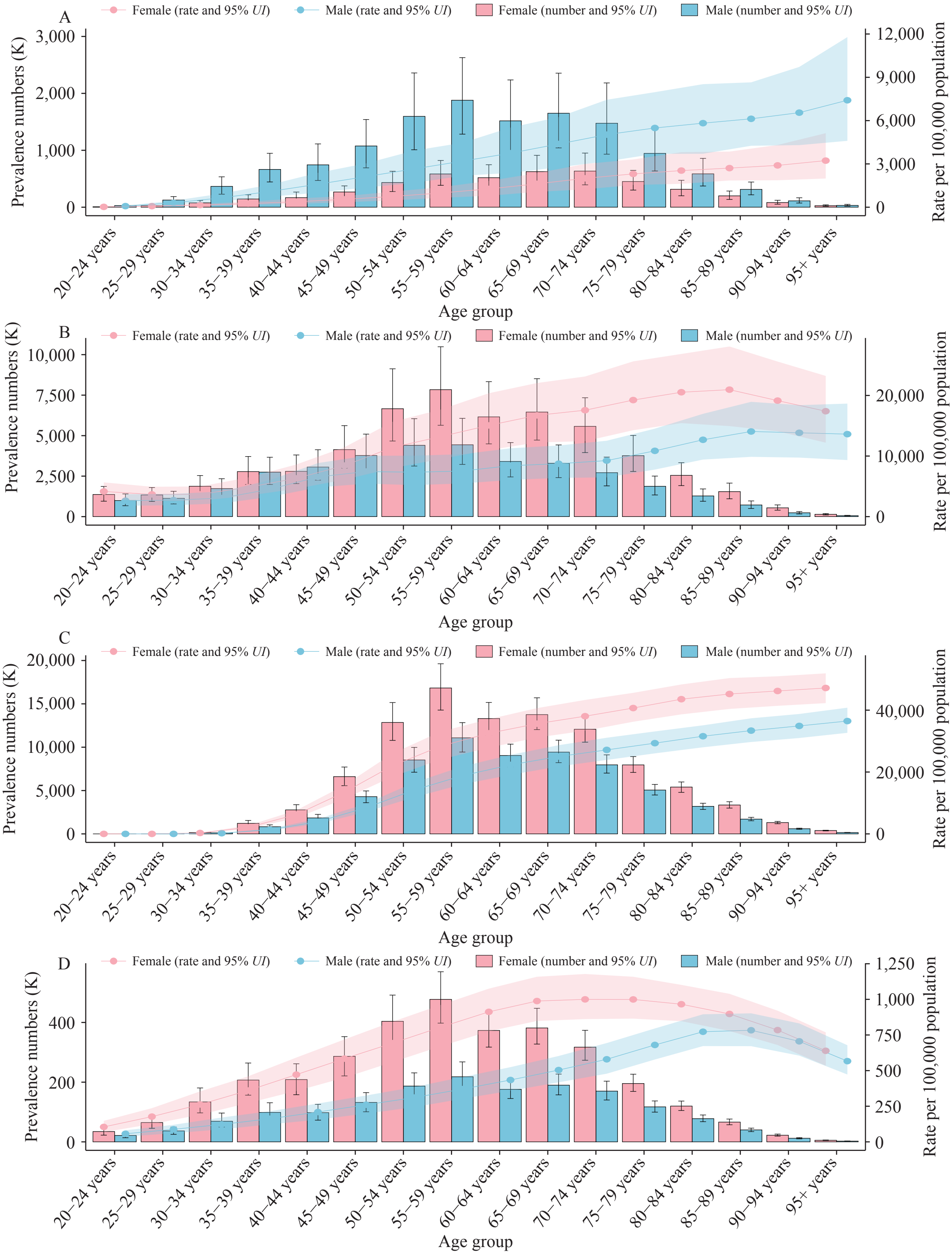

SUPPLEMENTARY FIGURE S1. Trends in age-standardized prevalence rates for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China, 1990–2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.
Abbreviation: APC=annual percentage change.
* *P*<0.05 indicates that the average annual rate of change during this period was significant.



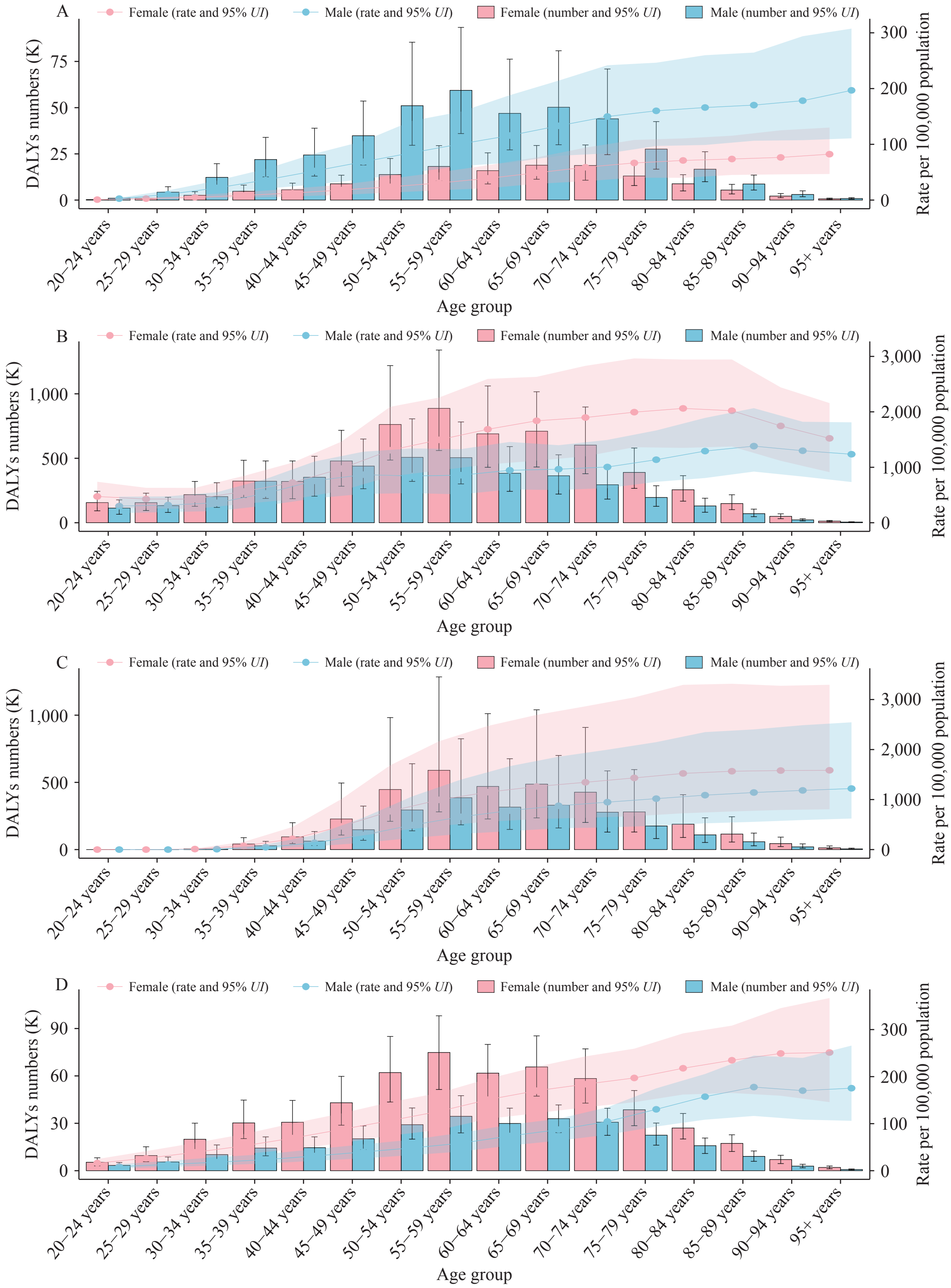

SUPPLEMENTARY FIGURE S2. Trends in age-standardized disability-adjusted life years (DALYs) rates for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China, 1990–2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.

Abbreviation: APC=annual percentage change.

* *P*<0.05 indicates that the average annual rate of change during this period was significant.

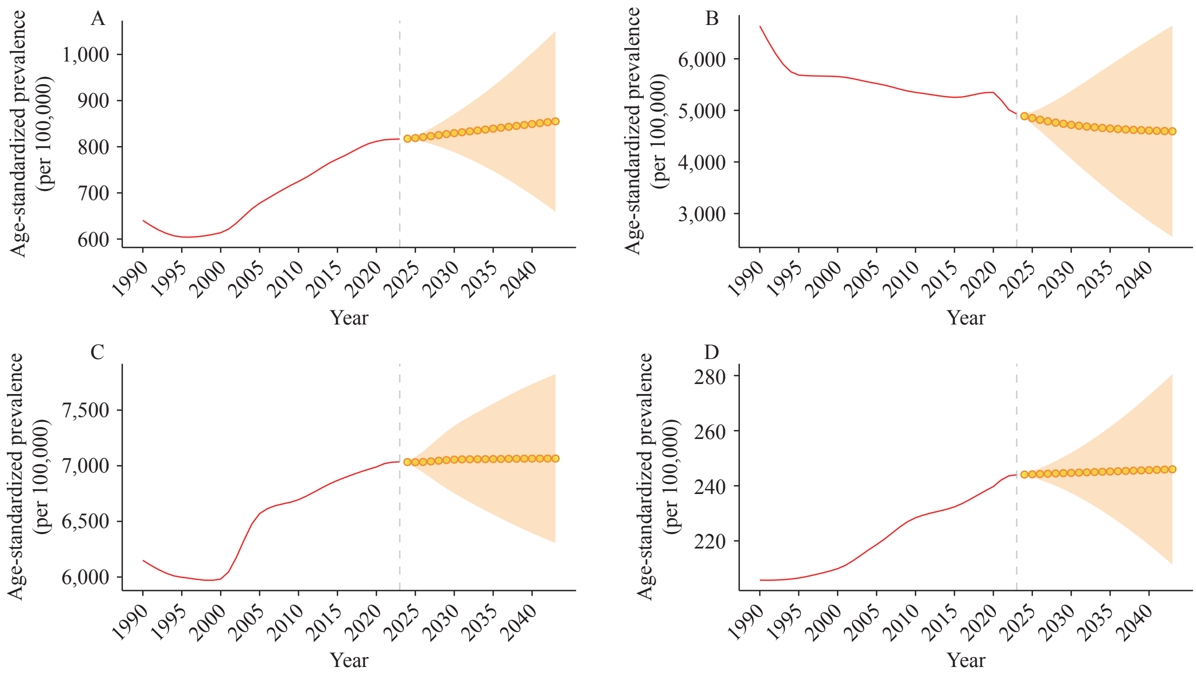



SUPPLEMENTARY FIGURE S3. Prevalence of gout, low back pain, osteoarthritis, and rheumatoid arthritis by gender and age group in China in 2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.
Abbreviation: *UI*=uncertainty interval.

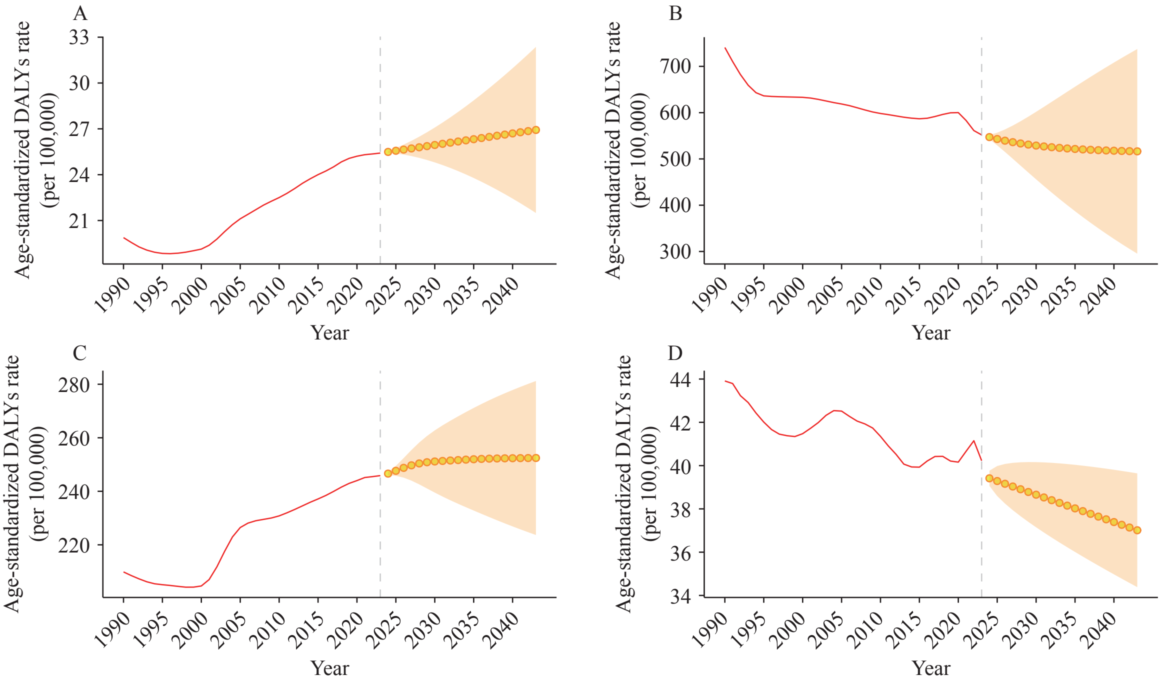



SUPPLEMENTARY FIGURE S4. Disability-adjusted life years (DALYs) rates of gout, low back pain, osteoarthritis, and rheumatoid arthritis by gender and age group in China in 2023. (A) Gout; (B) Low back pain; (C) Osteoarthritis; (D) Rheumatoid arthritis.

Abbreviation: *UI*=uncertainty interval.




SUPPLEMENTARY FIGURE S5. Projected age-standardized prevalence rates for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China. (A) Projected results for gout; (B) projected results for low back pain; (C) projected results for osteoarthritis; (D) projected results for rheumatoid arthritis.




SUPPLEMENTARY FIGURE S6. Projected age-standardized disability-adjusted life years (DALYs) rates for gout, low back pain, osteoarthritis, and rheumatoid arthritis in China. (A) Projected results for gout; (B) projected results for low back pain; (C) projected results for osteoarthritis; (D) projected results for rheumatoid arthritis.

Notifiable Infectious Diseases Reports

# Reported Cases and Deaths of National Notifiable Infectious Diseases — China, November 2025*

| Diseases | Cases | Deaths |
|---|---|---|
| Plague | 0 | 0 |
| Cholera | 1 | 0 |
| COVID-19 | 13,959 | 1 |
| SARS-CoV | 0 | 0 |
| Acquired immune deficiency syndrome† | 3,816 | 1,590 |
| Hepatitis | 119,225 | 299 |
| Hepatitis A | 1,062 | 0 |
| Hepatitis B | 101,715 | 42 |
| Hepatitis C | 13,572 | 256 |
| Hepatitis D | 30 | 0 |
| Hepatitis E | 2,287 | 0 |
| Other hepatitis | 559 | 1 |
| Poliomyelitis | 0 | 0 |
| Human infection with noval influenza virus | 4 | 0 |
| Measles | 75 | 0 |
| Epidemic hemorrhagic fever | 540 | 5 |
| Rabies | 25 | 18 |
| Japanese encephalitis | 5 | 1 |
| Dengue | 849 | 0 |
| Monkey pox§ | 65 | 0 |
| Anthrax | 30 | 0 |
| Dysentery | 1,683 | 1 |
| Tuberculosis | 48,885 | 234 |
| Typhoid fever and paratyphoid fever | 390 | 0 |
| Meningococcal meningitis | 15 | 0 |
| Pertussis | 1,246 | 0 |
| Diphtheria | 0 | 0 |
| Neonatal tetanus | 1 | 0 |
| Scarlet fever | 2,638 | 0 |
| Brucellosis | 3,149 | 0 |
| Gonorrhea | 9,639 | 0 |
| Syphilis | 50,385 | 5 |
| Leptospirosis | 38 | 0 |
| Schistosomiasis | 1 | 0 |
| Malaria | 312 | 0 |
| Influenza | 4,778,856 | 4 |
| Mumps | 6,700 | 0 |

Continued

| Diseases | Cases | Deaths |
|---|---|---|
| Rubella | 48 | 0 |
| Acute hemorrhagic conjunctivitis | 1,765 | 0 |
| Leprosy | 12 | 0 |
| Typhus | 154 | 0 |
| Kala azar | 32 | 0 |
| Echinococcosis | 315 | 1 |
| Filariasis | 0 | 0 |
| Hand, foot and mouth disease | 269,337 | 1 |
| Infectious diarrhea[¶] | 85,394 | 0 |
| **Total** | 5,399,589 | 2,160 |

* According to the National Bureau of Disease Control and Prevention.

[†] The number of deaths of Acquired immune deficiency syndrome (AIDS) is the number of all-cause deaths reported in the month by cumulative reported AIDS patients.

[§] Since September 20, 2023, Monkey pox was included in the management of Class B infectious diseases.

[¶] Infectious diarrhea excludes cholera, dysentery, typhoid fever and paratyphoid fever.

The number of cases and cause-specific deaths refer to data recorded in National Notifiable Disease Reporting System in China, which includes both clinically-diagnosed cases and laboratory-confirmed cases. Only reported cases of the 31 provincial-level administrative divisions in the Chinese mainland are included in the table, whereas data of Hong Kong Special Administrative Region, Macau Special Administrative Region, and Taiwan, China are not included. Monthly statistics are calculated without annual verification, which were usually conducted in February of the next year for de-duplication and verification of reported cases in annual statistics. Therefore, 12-month cases could not be added together directly to calculate the cumulative cases because the individual information might be verified via National Notifiable Disease Reporting System according to information verification or field investigations by local CDCs.

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